UNIV. OF MICH.

VOL. LXXXI, No. 2086. [All Rights Reserved.] NOVEMBER 16, 1917. [Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage.] PRICE FOURPENCE.

LONDON: PUBLISHING OFFICE, 4, LUDGATE HILL, E.C. 4 SUBSCRIPTION per annum, Postage inclusive, in Great Britain, £1 1s. 8d. Canada, £1 8s. 10d. ($5.80); to all other countries, 30s.—NEW YORK: D. VAN NOSTRAND CO., 25, Park Place, New York City. TORONTO, ONT.: WM. DAWSON & SONS, LTD., Manning Chambers. PARIS: BOYVEAU & CHEVILLET, Librairie, Etrangère, 22, Rue de la Banque.
Telegraphic Address: "Ageekay, Cent., London." A B C Code. Telephone Nos. City 997; Central 4425 (Editorial only).

LITHOLITE, Ltd.,
55—57, Hackney Grove, London, E. 8.
'Phone and Telegrams: Dalston 592, London.
MANUFACTURERS OF
MOULDED INSULATORS,
FIREPROOF AND OTHER GRADES.
ESTABLISHED NEARLY 20 YEARS.

SILUMINITE.
Fireproof—Non-Hygroscopic—High Resistant.
The New low priced British Insulating Material having qualities and characteristics possessed by no other Insulating Material. Used by the Government and leading Railways, and Electrical Firms.
THE SILUMINITE INSULATOR CO., Ltd.,
The Green, Southall, Middlesex.
Phone: Southall 30. See Large Advt. every alternate week.

T. H. FERGUSON, PAILIN & Co., LIMITED. A. C.
SWITCHBOARDS.
L. T. *EDWARD ST., Hr. Openshaw,* MANCHESTER. *Tel.: 339 Openshaw.* D. C.

INSTRUMENTS, CIRCUIT-BREAKERS,
AUTO-CUT-IN & CUT-OUTS.
THE **Record Electrical Co.,** LTD.
BROADHEATH, MANCHESTER.
TELEPHONE: 164 ALTRINCHAM.

BROOK MOTORS.
LONDON, LEEDS and HUDDERSFIELD.
See Advertisement, Sup. 34.

SWITCHGEAR.
ERNEST F. MOY, LTD.,
Manufacturing Electrical Engineers and Government Contractors.
GREENLAND PLACE, CAMDEN TOWN, LONDON.

NEW DISTRIBUTION BOXES.
THE CANTIE PATENT FUSE WILL CLEAR A "DEAD SHORT."
ALL CONNECTIONS FROM FRONT.
THE CANTIE SWITCH CO., LTD.,
67, MOUNT ST., NOTTINGHAM.

THE **SAXONIA**
ELECTRICAL WIRE CO., LTD.,
ALWAYS GREENWICH, S.E.
ALL BRITISH
FLEXIBLE CABLES.

CHURTON
SINGLE and POLYPHASE
MOTORS.
T. HARDING CHURTON & CO., LTD.,
Atlas Works, Water Lane, LEEDS.

LIFTS and - - - -
TRANSPORTERS.
Wm. WADSWORTH & SONS, LTD.
BOLTON.

"EMPIRE"
AUTOMATIC CONTROL
FOR
Shell Presses, Compressors, Machine Tools,
ELECTRIC CONTROL, LIMITED, GLASGOW.

WESTERN-ELECTRIC
COMPANY, LIMITED,
Norfolk House, Victoria Embankment, W.C.
Works: NORTH WOOLWICH, LONDON, E.
TELEPHONES & CABLES.
See Advertisement this week, p. xv.

CONNOLLY BROS., Ltd.,
for
WIRES AND CABLES.
See Advertisement last week, p. iii,

WIRES & CABLES.
THE
WHOLESALE ELECTRICAL CO., LTD.,
54/56, Oxford Street, London, W.
'Phone: Museum 1897.

CABLE LABELS,
Switchboard Labels, Name Plates, Instruction and Address Plates, Advertising Novelties, Club Badges, Checks, Tokens, Blanks, Die Stampings, Dies, Press Tools, Punches, and Cutters.
RELIANCE Engraving Co., Ltd., CHISWICK.

JULIUS SAX
FOR
WALL PLUGS.
EST. OVER 50 YEARS.

CABLES AND WIRES.
SWITCHBOARDS.
TRANSFORMERS.
JOHNSON & PHILLIPS, LTD.,
CHARLTON, LONDON, S.E.

Glasgow Office: 68, Gordon St.
OPENSHAW, DYNAMOS MOTORS ELECTROMOTORS, Ltd. MANCHESTER.
London Office: 49, Queen Victoria St., E.C.

START LIGHT.
THE
WOODHOUSE AUTOMATIC CLUTCH
PICKS UP LOAD AFTER STARTING.
THE VICTORIA DYNAMO & MOTOR CO.,
CRAVEN HOUSE, KINGSWAY, W.C. 2

MAVOR & COULSON, Ltd.,
GLASGOW.
MOTORS, DYNAMOS, SWITCHGEAR.

"WHITE STAR" LAMPS
DRAWN WIRE.
The "RUGBY" CARBON FILAMENT and RADIATOR LAMPS.
THE LONDON & RUGBY ENGINEERING CO., LTD.,
36 & 37, Queen Street, E.C. 4
Telephone: City 5252.

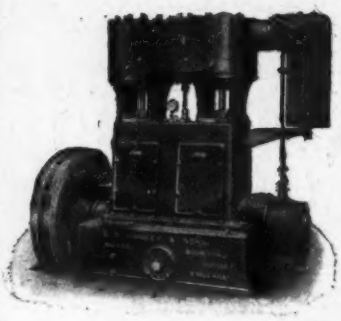
THERMIT, LIMITED,
675, COMMERCIAL ROAD,
Phone EAST 4157. LONDON, E. 14 Grams. "Fulmen Stop, London"
PATENT
Alumino Thermic Welding Process.

LEA RECORDERS
for measuring
Boiler Feed Water
and Condensed Steam.
The LEA RECORDER CO., Ltd., Deansgate, Manchester

—M·E·M—
Ironclad Switch and Fuse Gear.
Most efficient and economical. List Free.
Midland Elec. Mfg. Co., Ld., Barford St., B'HAM.

Advertisement Index, see page xxviii.

VERTICAL HIGH SPEED ENCLOSED STEAM ENGINES.



SIMPLE and COMPOUND.

4 to 160 B.H.P.

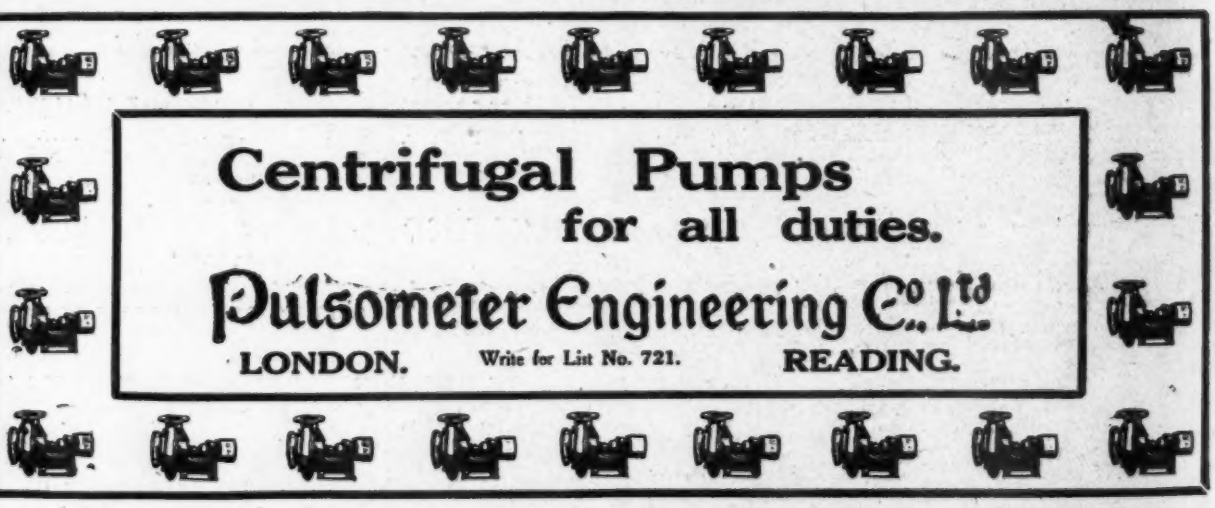
NOTE:

Substantial Construction.
Governor enclosed in Crank Case.
Convenient Oil Pressure Regulation.
Patent Duplex Reversible Strainer, can be cleaned whilst running.
Drip from Governor Valve Gland carried down through Vertical Rod to ground.

For DIRECT COUPLING TO DYNAMOS, FANS, PUMPS, Etc.
Silent Running, Economical and Reliable.
For SHIPLIGHTING and INDUSTRIAL WORKS OF ALL KINDS.
Write for further particulars.

E. S. Hindley & Sons, 11, Queen Victoria Street, LONDON, E.C.
Telephone: City 9804. Telegrams: Steamport, LONDON.
Works: BOURTON, DORSET.

Also VERTICAL GAS and OIL ENGINES.



Centrifugal Pumps for all duties.

Pulsometer Engineering Co. Ltd
LONDON. Write for List No. 721. READING.

VULCANISED INDIA-RUBBER

CABLE,

SWITCHGEAR, STARTERS, INSTRUMENTS, Etc.

DELIVERIES FROM STOCK.

ALL MANUFACTURED IN LONDON.

WM. GEIPEL & Co. HEAD OFFICE & WORKS: ST. THOMAS STREET, LONDON, S.E.
CABLE WORKS: WEMBLEY, LONDON.

THE

ELECTRICAL REVIEW.

VOL. LXXXI. NOVEMBER 16, 1917. No. 2,086.

ELECTRICAL REVIEW.

Vol. LXXXI.] CONTENTS: November 16, 1917. [No. 2,086.

	Page
The Institution of Electrical Engineers...	457
The Future of Industry	458
Telegraphy and Telephony at the French Front (*illus.*) ...	459
The Future of the Electrical Industry, by A. O. Holt... ...	460
A Long-Distance Duplex-working Central-battery System by R. L. Milburn (*illus.*)	461
Office Organisation in Municipal Electricity Undertakings, by G. W. Stubbings	462
Automatic Control of Blast Pressure for Diesel Engines, by H. S. Russell (*illus.*)	462
War Items	463
Legal	465
Correspondence—	
The E.T.U. or the A.E.S.E.?	466
"The Association Movement"	467
Business Notes	467
Notes	472
City Notes	475
Stocks and Shares	476
Domestic Electric Heating Problems. (*illus.*)	477
The Institution of Electrical Engineers...	478
New Patents Applied for, 1917	480
Abstracts of Published Specifications	480
Contractors' Column ... ... Advertisement page	xxii

THE ELECTRICAL REVIEW.

Published every FRIDAY, Price 4d.

The Oldest Weekly Electrical Paper. Established 1872.

TO BE OBTAINED BY ORDER FROM ANY NEWSAGENT IN TOWN OR COUNTRY.

OFFICE: 4, LUDGATE HILL, LONDON, E.C. 4.

Telegraphic Address: "AGRIKAY, LONDON." Code, A B C.

Telephone Nos.: City 997; Central 4635 (Editorial only).

The "Electrical Review" is the recognised medium of the Electrical Trades, and has by far the Largest Circulation of any Electrical Industrial Paper in Great Britain.

Subscription Rates.—Per annum, postage inclusive, in Great Britain, £1 1s. 8d.; Canada, £1 8s. 10d. ($5.80). To all other countries, £1 10s.

FOREIGN AGENTS:

ADELAIDE: Messrs. Atkinson & Co., Gresham Street.

AUCKLAND N.Z.: Gordon & Gotch, Albert Street; The Mining and Engineering Review, 31A, Strand Arcade, Queen Street.

BRISBANE: Gordon & Gotch, Queen St.

CHRISTCHURCH, N.Z.: Gordon and Gotch, Manchester Street.

DUNEDIN, N.Z.: Gordon & Gotch, Princes Street.

JOHANNESBURG, CAPETOWN, BLOEMFONTEIN, DURBAN, PORT ELIZABETH, &c.: Central News Agency, Ltd.

LAUNCESTON: Gordon & Gotch, Cimitiere Street.

MELBOURNE: The Mining & Engineering Review, 90, William Street; Gordon & Gotch, Queen Street.

MILAN: Fratelli Treves.

NEW YORK: D. Van Nostrand, 25, Park Place.

PARIS: Boyveau & Chevillet, 22, Rue de la Banque.

PERTH, W.A.: Gordon & Gotch, William Street.

ROME: Loescher & Co., Corso Umberto 1° 307.

SYDNEY: The Mining & Engineering Review, 273, George Street; Gordon and Gotch, Pitt Street.

TORONTO, ONT.: Wm. Dawson & Sons, Ltd., Manning Chambers; Gordon and Gotch, 132, Bay Street.

WELLINGTON, N.Z.: Gordon & Gotch, Cuba Street.

Cheques and Postal Orders (on Chief Office, London) to be made payable to THE ELECTRICAL REVIEW, and crossed "London City and Midland Bank, Newgate Street Branch."

THE "ELECTRICAL REVIEW'S"

ELECTRICAL & ALLIED TRADES DIRECTORY

(THE RED BOOK),

1917 EDITION.

H. ALABASTER, GATEHOUSE & KEMPE,

4, Ludgate Hill, London, E.C. 4.

THE INSTITUTION OF ELECTRICAL ENGINEERS.

THE Inaugural Address affords the one opportunity for the President of a great Association, such as the Institution of Electrical Engineers, to say what he thinks upon any subject whatever, with the comfortable assurance that no man can say his nay—for it is not open to discussion. That Mr. Wordingham availed himself to the utmost of the opportunity will be admitted by all who were privileged to hear his address on Thursday last week, and we tender our respectful congratulations not only on the manner of its delivery, which testified to the physical energy of the speaker, but also on the matter of the address, crammed as it was with ideas, aspirations, suggestions, and exhortations all directed towards the advancement of the Institution and of the industry with which it is associated.

We must confess that the opening passages of the address cast a momentary gloom over our spirits; the President, whilst emphasising the importance of the functions of the Institution with regard to scientific progress, declared that it should not attempt to look after the commercial interests of any one of the sections of which it was composed, on the ground that it was impossible for it to do so efficiently. Yet in an earlier paragraph he said:—"The Institution and the industry should be one, and if they are not, it is our business to make them so." Our thoughts are irresistibly carried back to the spring of 1914, when the Industrial Committee, which had been framed to secure the widest representation of the industry, was deliberately smothered by the Council, which refused to confirm a *compromise*—not a conflict—between two important sections of the industry on the ground that the agreement included clauses relating to trade discounts, and that it was undignified to deal with money matters. Likewise, the Council declined to accept the Committee's proposal to set up a national testing institution (a proposal dear to the heart of Mr. Wordingham) on the ground that it had a "political" tendency.* How, in Heaven's name, can the Institution be identified with the industry if it adopts this "high-browed" attitude? The President cannot have it both ways.

Mr. Wordingham has made no secret of his opposition to the "broader policy" initiated by Dr. Ferranti; he is a clean fighter, as befits the Electrical Engineer to the Admiralty, and he set forth his views on this subject, as well as many other points that are dealt with in his address, in an article in our issue of May 29th, 1914. While we do not see eye to eye with him in this matter, we respect his views, well knowing that no one has worked harder for the Institution than he.

In order to solve the difficulty arising out of the heterogeneity of the components of the Institution, the President proposes that each of these groups

* For a fuller treatment of these topics, see the ELECTRICAL REVIEW, May 22nd, 1914, p. 853.

shall be organised after the manner of the I.M.E.A. and the B.E.A.M.A., Associations whose activities unquestionably have been of the greatest value to their constituents and to the industry in general, and that each group shall be directly represented upon the Council, in addition to members elected by the whole body of members of the Institution. This also is one of the proposals which he put forward in the article to which we have referred, and it raises an important question of principle. Every member of the Council is understood to act in the interests of the whole body of members, and not in the special interests of the section with which he happens to be more particularly associated. However, the proposal is distinctly interesting; whatever the theory, in practice an elected representative is often called upon to act on the immediate behalf of his electors, and if that were accepted as one of the duties of his office, it would appear desirable that steps should be taken to ensure the adequate representation of all the groups concerned.

We have often thought it a pity that the fine building of the Institution could not be utilised to greated advantage; as the President points out, its "load factor" is painfully low; and the restrictions imposed by the regulations which bind the Institution under the Companies' Acts at present constitute an insuperable obstacle to its more profitable utilisation. Undoubtedly there is a large number of electrical engineers who now foregather in the neighbourhood of Kingsway, and who, with others, would gladly make the Institution their rendezvous if it afforded them the necessary accommodation. We believe that there is here an immense opportunity for the Institution, once again in possession of its home, to formulate and carry out a bold scheme which would not only command the success which has attended the Manchester Engineers' Club, but would have even more far-reaching results. With the unique example of the Engineering Societies of New York before us, we still hope to see the Institutions of this country co-operating in the establishment of an Engineering Headquarters which shall become the centre and focus of the engineering activities of the Metropolis and of the Empire. And passing over many other useful and interesting suggestions, which will be found in the abstract of Mr. Wordingham's address elsewhere in this issue, this brings us to what we hope may prove to be the crowning achievement of his year of office—the conferment of a Royal Charter upon the Institution and its kindred societies. Could this be secured, many of the difficulties and disabilities which at present hamper the progress of engineering, and especially limit the usefulness of engineering societies, would at one stroke be removed; the status of the profession would be recognised, and its influence would be immensely increased; it would offer a career comparable to that of the other learned professions, to which it is at present only an unhonoured appendage; it would constitute a body representative of engineering, and entitled to speak and act in its name, and it would bring together into one fellowship the whole body of engineers, a feat that could be accomplished by no other means.

The Institution of Civil Engineers, we may point out, was incorporated by Royal Charter in 1828; judging by results, it would appear that the terms of its Charter were not so framed as to secure the foregoing benefits, but these could be amended.

While the whole address bristles with topics calling for comment, the exigencies of space have compelled us to confine our attention this week to but one-third of it, and we conclude our remarks for the moment with the suggestion that, so far as the Institution is concerned, the proposal that it should obtain a Royal Charter is by far the most important of the President's propositions, and should command the hearty support of every member.

The Future of Industry.

Sir R. V. Vassar Smith, who is President of the Institute of Bankers (his election also as President of the Federation of British Industries is already known to our readers), delivered his inaugural address on November 7th. The speaker did not attempt anything in the nature of an original discourse. He limited his address to a plain summary of the outstanding facts of the industrial situation. Most of the points here brought together have been urged repeatedly in our pages during the past three and a half years, and some of them were stated here with emphasis many years before the war. In those days they often seemed to fall upon deaf ears. To-day we are pretty well agreed as to what ought to be done. Let us hope that in many directions we may be able to carry conviction on to practical achievement. Sir Richard sees no reason for dejection or discouragement in regard to after-the-war conditions. We shall have to carry a heavy financial burden, and the work of reconstruction will be long and arduous, but we shall build on firmer and fairer foundations than formerly. The President agreed that it was impossible to go back to pre-war conditions, but we had to face the work of rebuilding without suspicion, distrust, or mutual hostility, and must remove, as far as possible, all friction from the machinery of progress. In addition to our financial burden, there would be the cost of repairing the wastage caused by the war, an enormous amount that must be made good, and money must be found to provide the means for increased industrial production. Only with greater industry and production could we meet our difficulties. The first and most serious question was the relations of Capital and Labour. Only by harmonious working between these two forces could the required result be obtained. British trade was capable of vast expansion, and by that means they would have a better remuneration of labour affording a higher standard of living, shorter hours, better housing, and a share of the profits after giving a proper return on capital, and providing reserves for depreciation and betterment. High wages were not necessarily a handicap; low-paid labour was not necessarily economical. Labour must be economised with the loyal co-operation of the working man. Some English employers had reduced their working hours with beneficial results. Reasonable holidays with pay should be allowed to the manual worker as to the clerical. Conferences which had been held to bring about better relations between employers and employed impressed him favourably, and he believed good results would follow. Production without extended markets would not be sufficient. In addition to being in a better position to supply Home demands, they would have to seek wider fields in the Empire and in foreign countries. We had suffered in the past from want of British representation. The necessity for large scale industrial organisation would remain after the war, indeed it would be irresistible, but he hoped and believed that the necessity for State control was only temporary. The day of small industries on individual lines was past, and our manufacturers and traders must organise for united effort, or many of the obstacles would not be overcome. Organisation meant increased stability, and a stable industry could weather storms which would wreck the small producer. The financing of industry would be immensely facilitated by organisation. An unstable, unorganised industry was the despair of bankers. Financial assistance might be required, Overseas trade generally demanded long credit and longer term advances than deposit bankers usually gave. New ideas must be investigated and developed, and that often required money, patience, and experiment.

TELEGRAPHY AND TELEPHONY AT THE FRENCH FRONT.

The maintenance of continuous communication between General Headquarters and every part of the fighting front is one of the most important factors of success in the kind of warfare which has been evolved during the long struggle in France and Flanders. The forward course of traffic is from G.H.Q. to the Headquarters of the various Army Corps, thence to the respective divisions, brigades, and finally the trenches. In the rear are the main lines of communication between G.H.Q. and the high command, London, and Paris, as well as the hospital bases, store depôts, &c.

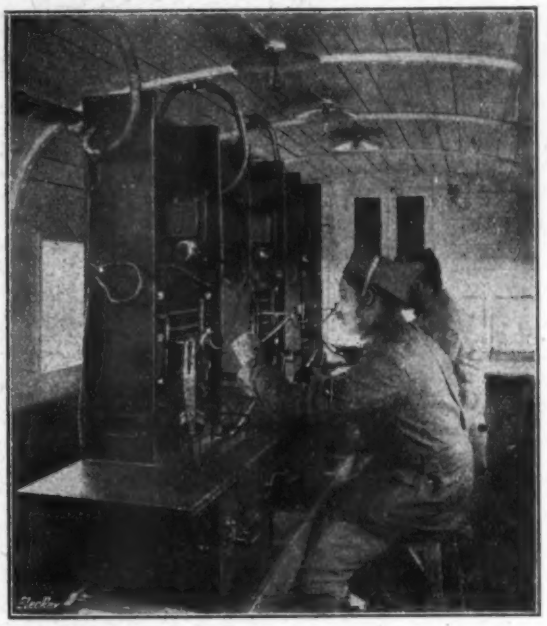
[*French Official.*]

Fig. 1.—A Central Telegraph Station.

[*French Official.*]

Fig. 2.—Dynamo Room.

As the network approaches the firing line, the methods and apparatus adopted assume simplified and specialised forms, more portable and more readily rigged up and repaired than in districts more remote from the zone of conflict, and finally arrive at the telephone and buzzer sets which represent the limit of handiness and simplicity. We recently (June 1st) illustrated a number of signalling stations in this part of the French system of communications—in and near the trenches—and we are now able to reproduce some French official photographs showing the arrangements in vogue further back, but still beyond the limits of the permanent lines of the telegraph and telephone administration. It will be seen that portability is an essential element in the constitution of these stations, but the apparatus and methods employed approximate more closely to those used by the civil service.



[*French Official.*]

Fig. 3.—Portable Telephone Switchboard in Cabin.

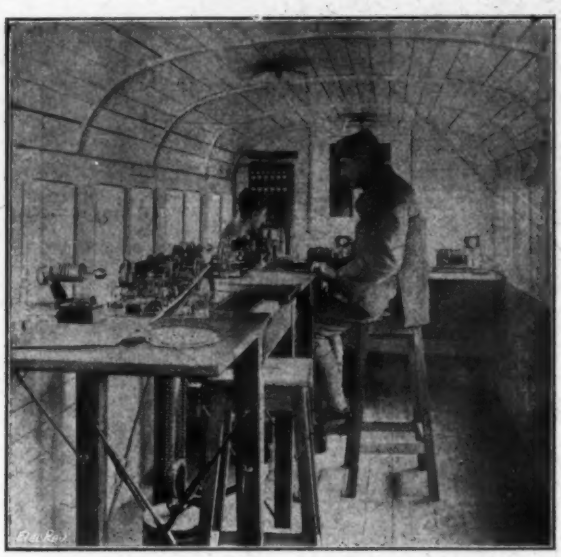
Fig. 1 is an exterior view of a "Central d'Armée," consisting of cabins which are provided with wheels, but are, for the time being, mounted on trestles and furnished with convenient staircases. A terminal pole, from which telegraph and telephone wires will radiate to other offices, is approaching completion, and the indications are that this station is not likely to be moved for a fairly long period. The same impression is given by fig. 2, which represents the interior of the dynamo room, a shed roofed with corrugated iron and equipped with four petrol engines driving small dynamos for charging accumulators, lighting the offices, &c.

Fig. 3 shows the interior of one of the cabins, fitted with a magneto-calling telephone switchboard, constructed in portable sections, which can be closed for transport; the services of two men are required, indicating that there is a considerable amount of traffic through this office.

In fig. 4, another interior, there is further evidence of proximity to—or, at least, connection with—civilisation, in the shape of two Hughes printing telegraphs, in addition to telephone apparatus; and in fig. 5, the interior of a "Central de Cap d'Armée," are two telephone switchboards and a Morse recording telegraph instrument.

Since the arrival of the American contingent at the Front, says *Telephony*, the United States Army Signal Corps has completed an entirely independent system of communication lines connecting General Pershing's headquarters with all parts of his command and adjoining

villages. Everything except the poles was brought from America. Admirable portable telephone switchboards have been devised and supplied at the shortest notice by the U.S. manufacturers. It is interesting to note, too, from the



[*French Official.*]

FIG. 4.—HUGHES PRINTERS IN CABIN.

Telegraph and Telephone Age, that the Paris authorities have modified the rule which was laid down at the beginning of the war restricting telephone conversations to the French language; English is now permitted.

THE FUTURE OF THE ELECTRICAL INDUSTRY.

BY A. O. HOLT.

MUCH has been written and said during the past few months concerning a subject of great national importance, viz., "Our Educational System." Mr. Fisher, the Minister for Education, deserves the thanks of the nation for the able manner in which he has reviewed and dealt with the system as a whole, and, undoubtedly, a new era has dawned for the teaching profession. Chief amongst the findings was the fact that teachers were most badly paid, so much so, that many who had a natural gift for training our children were ignoring that gift, and turning their attentions to more remunerative professions. Moreover, it has been noted that in the past there has been an entire absence of sympathy between various sections of those responsible for the training of the youthful minds of the country. Our great Universities have shown little or no interest in the Public Schools. The Public Schools have never been in real touch with our large Grammar Schools, while they, in turn, have regarded the Primary Schools as the medium merely for turning their own particular grade of youth out upon the world. In short, none of the sections have felt that they had anything in common.

These defects are, in the near future, to be remedied. There is to be a better and more sympathetic understanding between the various grades of the teaching profession, and a large Government grant has been made for the purpose of increasing salaries, as an inducement to those best qualified for this important work.

Now, the writer is of the opinion that while the foregoing does not concern engineers, it forms an excellent parallel for the electrical industry, and many serious defects might be discovered by a close study of our engineering methods by those engaged in this important science.

With us much has been written and said about our trade after the war, we must be prepared to hold our own against other countries, particularly our enemies, in the struggle for electrical markets. We are engaged in a vast linking-up scheme, whereby we can economise our coal consumption so as to work at a high efficiency, and, generally speaking, we tell ourselves we must be in the van, both technically and commercially, in all matters concerning the electrical future. What are the facts to-day? What is the canker that is gnawing at the roots of our business in just the same way that it was in the teaching profession? Economy in salaries—that is the canker. Our leading engineers have been making precisely the same mistake as the education authorities did.

The writer was, some few weeks ago, invited to the house of a gentleman of what might be termed higher middle-class standing. The morning was spent discussing the best methods of entering the electrical industry as a career for his son, a promising youth just leaving school. The matter was thoroughly discussed, and it was pointed out that much hard work and study would have to be put in to rise to anything more than a mediocre position. Salaries were also mentioned and prospects of advancement, and there for a time the matter ended. Some weeks later the writer found that the youth in question had gone into an entirely different line of business, the explanation being that the chances of a decent salary and reasonable advancement were so remote for the work to be put in that it had been decided the youth could not hope to attain to, or keep, the social standing he had been used to for many years to come.

Inadequate salaries!—there it is. Many excellent youths, brainy, and with a predilection for the profession, are kept from engineering because the average father cannot find anyone of his acquaintance in the engineering line who is receiving a salary anything like in keeping with that of an ordinary middle-class business man. It would be interesting to know what proportion of electrical men under 40 years of age are getting over £250 per annum. The writer has seen engineers of considerable ability resign the positions they held and leave the profession

[*French Official.*]

FIG. 5.—TELEPHONE SWITCHBOARDS AND MORSE INKER IN CABIN.

entirely to take up more remunerative posts in businesses in which the engineering part was but a side issue.

Engineers will stick it, for pride of profession, up to a

point, but, unless their hopes are fulfilled, and they get a salary in keeping with that of the average business man, they will not hesitate to take their leave of engineering, and will advise our youths to fight shy of it also.

Now, in taking a general survey, what do we find? Our leading engineers, both in control of manufacturing works and of large power supply undertakings, are out to economise first, last, and all the time, and this economy usually takes the form of small salaries. They are making the same mistake as the Board of Education did—starving the profession—choking off, as it were, the would-be engineers of the future by the treatment of the staffs under them. It is a lamentable fact that so soon as an engineer assumes control, either of a works or a large supply system, his whole pride as an engineer is invariably sunk in the piling up of dividends or relieving of rates, chiefly at the expense of his fellow engineers, who are treading exactly the same paths that he trod. Our engineers become more or less successful managers, and, unfortunately, cease to appreciate the valuable work carried on by their staffs, as proved by the miserable salaries doled out. Let engineers in command note that in sacrificing their profession and their fellow engineers they are not only doing a disservice to the electrical industry of the country, but are diverting many of the best brains of the youthful element into more remunerative channels.

And the staffs, that long-suffering body of men who have proved their patriotism over and over again during the past three years, what have they in common with their chiefs? Nothing. They have learned, reluctantly and with bitterness, the lesson that Governments only treat with collective organisations, and that the chief engineers, to whom they looked in their loyalty for some assistance, have literally left them to starve. Staffs are now organising, and are resolved to have a say in the scheme of things. The spirit of organisation is in the air, and is permeating the tissues of the most conservative amongst us; but to what end? The consolidation of our forces so as to be in the front rank of engineering matters after the war?—far from it. Rather to force chief engineers to give them a living wage, and one that they need not be ashamed of owning up to. The average staff engineer is being irritated beyond endurance in finding himself barely better off, and in many cases worse off, than the man with no technical ability, while his position will not bear comparison with that of an ordinary business man.

What is needed just now is an engineer to play the *rôle* of Mr. Fisher, in the electrical world—someone to review the industry as a whole, who can put his finger on the weak spots, see that the "economy" idea—especially in salaries—is not carried too far, and, with an eye to the future, map out a course in which our leading engineers, staffs, workmen, and embryo engineers can co-operate, so as to steer the electrical industry towards a better, more peaceful, and more sympathetic understanding during the commercial war that will inevitably follow with the introduction of peace conditions.

A LONG-DISTANCE DUPLEX-WORKING CENTRAL-BATTERY SYSTEM.

By R. L. MILBURN.

In this system the apparatus at the home station consists of a double-current key with 9 terminals, 3 top, 3 bottom, and 3 movable, a polarised G.P.O. 200-ohm relay, a rheostat with condensers up to 30 microfarads, and a sounder and local battery. At the out station (fig. 1) the apparatus consists of a key, Vyle sounder, and rheostat without any condensers. Three relays joined in series locally were used in place of the key, as shown in fig. 2.

Mode of Balancing.—The out station depresses his key, cutting off his rheostat, and measures the current, say 39 milliamperes; he then releases his key, and adjusts his rheostat until he measures $\frac{1}{3}$ of 39, or 13 milliamperes; 26 milliamperes is then measured in the rheostat branch after adjusting the rheostat.

Both stations now start balancing, the home station increasing capacity till signals are perfect. The Mandalay-Rangoon circuit, 386 miles of iron wire, required 21 microfarads to balance the capacity of the line.

When Wheatstone and Baudot were both working, 39 milliamperes were found to give perfectly satisfactory results. Both relays were adjusted neutrally.

The currents utilised for working duplex with Rangoon were:—

1. 7 and 21 milliamperes with 100 volts.
2. 10 and 30 " " 140 "
3. 13 and 39 " " 160 "

The currents can be traced as follows:—

1. Neither station sending—Mandalay line coil has 13 milliamperes negative current passing from K to L, and 26 milliamperes negative current passing from K to W through rheostat, giving 13 milliamperes negative current passing in the non-working direction of Mandalay relay

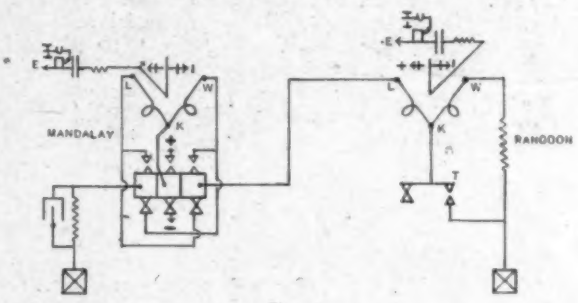


Fig. 1.

at the same time that 13 milliamperes negative current passes on to Rangoon through his relay from L to W to rheostat and earth; being in the non-working direction, at both stations the relay tongues remain at spacing.

2. Mandalay sending—Mandalay line coil has 13 milliamperes positive current passing from K to W, and 26 milliamperes positive from K to L, giving a preponderance of 13 milliamperes positive current passing from K to L in the non-working direction, hence Mandalay relay remains at spacing, but 13 milliamperes positive current passes through Rangoon relay from L to W, producing a mark at that station.

3. Rangoon sending—Mandalay line coil gets 39 milliamperes negative current passing from K to L, and 26 milliamperes negative current passing from K to W, 39—26

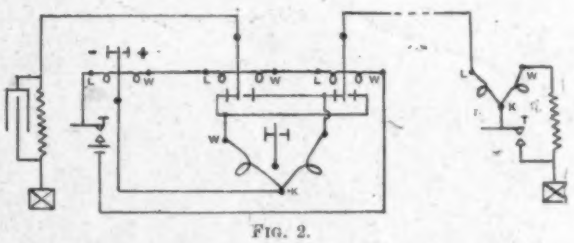


Fig. 2.

giving 13 milliamperes in working direction, and causing a mark at Mandalay, but 39 milliamperes negative current passes through Rangoon relay from L to K in the non-working direction, causing the Rangoon relay tongue to remain at spacing.

4. Mandalay and Rangoon both sending—Mandalay line coil gets 39 milliamperes positive current, passing from K to W, and 26 milliamperes positive current passing from K to L, 39—26, giving 13 milliamperes passing in the working direction at Mandalay, and 39 milliamperes positive current passing from L to K in working direction at Rangoon, hence both station relays will mark.

The system has been worked successfully between Rangoon and Mandalay, a distance of 386 miles, and there is reason to believe that it could be worked up to 600 miles.

D

OFFICE ORGANISATION IN MUNICIPAL ELECTRICITY UNDERTAKINGS.

By G. W. STUBBINGS.

The subject matter of this article, which some two or three years ago received a good deal of attention, has lately been little heard of. As there is reason to believe that the separation of the financial management of municipal electrical undertakings from the electrical engineer's department is by no means obsolete, it may be useful to say a few words on this matter with a view to pointing out the peculiar disadvantages of such a system.

The system in question may be briefly described as one in which the control of all money matters in connection with a municipal electricity undertaking is vested in the department of the borough accountant, and is quite removed from the jurisdiction of the engineer and manager. The theoretical reason for this procedure is presumably based upon the idea that finance is a matter as important in its way as the generation and distribution of electricity, and should therefore be controlled by an official and staff specially trained in such work. Obviously, such a principle applied with sufficient strictness would remove from the control of the engineer and manager the whole of the clerical staff. This extreme course is not adopted, but a line seems to be drawn so that all matters involving the paying or receiving of money are managed by the accountant's department. Even this rule has to be relaxed slightly in some small instances—for example, in the case of small cash sales at the works or the showroom when money is received. It therefore appears that the system, so far from resting on any very logical or well-defined principal, is rather the outcome of sentiment or prejudice. It results in such a curious state of affairs as the business of one concern being carried out in two separate offices, which may be a mile distant from each other; or of a clerk in the electricity works office who deals with meter readings, having his time occupied, not in making out consumers' accounts, but in copying the meter readings into books, which are duly taken to the office of the borough accountant in order that another clerk may copy them into another book, and, finally, make out the consumer's demand note.

The real reason for such a state of affairs, inefficient and inconvenient as it undoubtedly is, seems to be found in a misunderstanding of the legitimate functions of the borough accountant's department. Whatever work such department may carry out, or whatever control it may exercise in connection with the smaller non-trading departments of a Borough Council, it seems clear that the accountant and his staff should function, with respect to the electricity undertaking, as auditors only.

A small shopkeeper will, if he is wise, take care to have his books made up periodically by a competent book-keeper; but a large firm will keep a staff sufficiently trained to do this work, and will not call in outside assistance to make out customers' accounts. The auditing of the books by qualified accountants is, of course, compulsory in the case of a limited liability company, and it is, perhaps, the legal status thus given to accountants which makes them inclined, in the opinion of many impartial onlookers, occasionally to over-estimate the scope of their responsibilities and importance.

The advantages of having the whole of the business side of an electricity undertaking under the direct control of the electrical engineer and manager are obvious and manifold. A larger salary can be paid to the chief clerk, who can then be a man having a good training in accountancy. Overlapping of the work will be entirely eliminated; and in cases where the offices of the electricity department and the borough accountant are some distance apart, a host of correspondence will be saved which otherwise would be necessary, due to the many queries which would inevitably crop up owing to the abrupt break in the routine of the work. The steps in the sequence from reading the consumer's meter to receiving the money in settlement of his account are easy and gradual; but if the routine be interrupted in the middle of its course and transferred to other hands, friction is almost bound to occur.

A further advantage in the system of single control arises from the fact that a great number of consumers' complaints are received at the time of paying their bills. This is, perhaps, not unnatural—and frequently these complaints are of a most trivial nature. If they are received by the accountant's department they have all to be noted, and communicated by letter to the electrical engineer, when, as it is then sometimes impossible to decide the importance of any particular complaint, great waste of time can be occasioned by following up such as are only trivial. If these complaints were received at the office of the electricity department, the majority of them could be dealt with there and then, an immense amount of time thereby being saved.

It is, of course, understood that the borough accountant will be vested with the authority of an auditor with respect to the financial matters of an electricity undertaking. This is, however, quite a different matter from the normal routine work being carried out by his staff, and in his office. Matters concerning the capital of the undertaking and the raising of loans will also, naturally, be the accountant's concern. It seems, however, that there is a very clear case for the routine work of rendering consumers' accounts, and the collecting of the same, being undertaken by the clerical staff of the electricity department. The disadvantages and clumsiness of the older system are manifest, and it is greatly to be deplored that prejudice and conservatism so frequently stand in the way of the inauguration of a simpler, smoother, and more efficient system.

AUTOMATIC CONTROL OF BLAST PRESSURE FOR DIESEL ENGINES.

By HERBERT S. RUSSELL, B.Sc., M.I.E.E.

(*Abstract of paper read before the* Diesel Engine Users' Association.)

The working of a Diesel engine is substantially improved if the pressure of the air which blows the fuel into the cylinders is regulated according to the quantity of fuel to be blown in, or, in other words, according to the load on the engine, as the quantity of fuel used varies with the load. The present practice is for the regulation of the blast pressure to be effected by hand, but the objection to this is that, with variable loads, it demands constant attention from the man looking after the engine.

Automatic devices to effect this control have been tried in the past, without practical success. In the electrical air regulating device which has been developed by Messrs. Mirrlees, Bickerton & Day, the difficulties have been overcome, and the air pressure can be varied according to the load, irrespective of the efficiency of the air compressor, and without loss of compressed air.

Fig. 1 is a diagram of connections. The main current is passed round the solenoid A and controls the finger B, which is arranged to move round the scale of a pressure gauge, and is calibrated to point to that blast pressure which is best for the engine for the amount of power being generated at the moment, its "zero" or "no load" position being the no-load blast pressure. The pressure gauge is connected to the blast pipe; consequently its finger C points to the pressure in that pipe at any time. Both fingers are provided with platinum contact pieces D, E, and are insulated one from the other. The fingers B and C act therefore as a single-pole switch and make and break a relay circuit, which in its turn makes and breaks the circuit which operates the throttle valve F on the air-compressor inlet. The normal position of the throttle valve is closed, and it is held in that position by a spring G.

Supposing now that the engine is at work and the pressure in the blast pipe is lower than that indicated by the finger B, as being the proper pressure for the load, the fingers would be apart, and no current would pass through the relay coil H, so that the core J would make contact with the carbons K. This would complete the compressor throttle valve circuit, and the current would then pass through the solenoid L and pull the core (which terminates in the throttle valve F) downwards, and so cause the throttle valve to be held wide open, as illustrated on the diagram of connections. The pressure in the blast pipe would then rise rapidly (the compressors always have a substantial margin of capacity), so causing the gauge finger C to move up to and make contact with finger B. This would complete the relay circuit and cause a current to flow through the relay coil H and pull up the core J, thus breaking contact with the carbons K and breaking the compressor throttle circuit. The throttle valve F would immediately close under the action of the spring G, and it would remain so until the fingers came apart again. The slightest variation in the blast pressure or the load will operate the

relay, thereby opening or closing the throttle valve, as the case may be. When on a dead steady load the relay is continually in operation, and no variation in the blast pressure is visible. A variation of from 550 lb. ("no-load" blast pressure) to 950 lb. ("full-load" blast pressure) can be obtained in four seconds. As the fly-wheel takes several seconds to slow down in speed so that more fuel can be admitted by the governor, the correct pressure is always on the top of the fuel.

Fig. 2 shows the arrangement of the air inlet control valve for the compressor. This is divided into two parts, the top portion containing the valve and the bottom portion the solenoid. In the valve casing A, which is made of cast iron, a gun-metal liner B is fitted, having a series of holes in its periphery. In this liner the piston valve C is situated. This piston has a series of holes in its periphery which come opposite the holes in the liner when the valve is open. A groove is turned on the inside of the liner B in line with each row of holes, and similar grooves on the outside of the piston, so that the air has a free passage through the holes even if the piston is turned so that the holes do not coincide. The piston is fixed to a central spindle D, the bottom part of which forms the core for the solenoid. The valve is normally held closed by the spring E.

When current passes through the coil F situated in the bottom or coil casing G, the pressure exerted by the spring E

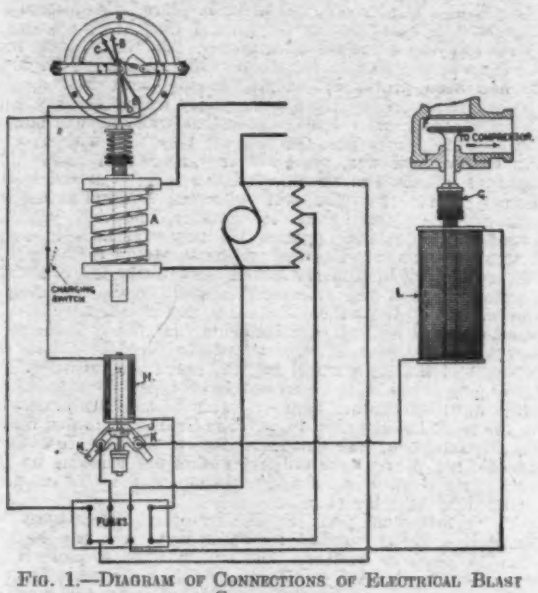


Fig. 1.—Diagram of Connections of Electrical Blast Controller.

is overcome and the valve opened. The requisite opening is governed by the top adjusting nuts H, or, rather, the minimum opening required for "no-load" blast.

When the valve is opened air is drawn into the valve (due to the suction of the air-compressor piston) through the openings K and L into the interior of the valve, then through the holes in the piston and liner into the annular space M round the valve, and thus into the compressor. Holes N in the bottom of the piston are provided for the purpose of balancing the piston when in operation, so as to ensure free action, which would otherwise be impeded by the cushion of air below the piston. The air which passes through the annular opening L enters the piston through the holes N *viâ* the holes O drilled in the spigot of the coil casing G.

The coil itself F is made in two sections, and wound in such a way that both the terminals come to the centre of the coil, and, furthermore, are brought from the outside of the coil into the terminal block P. In the event of one of these terminal wires breaking, to obtain a new end all that is required is to unwind sufficient from the outside of the coil for this purpose.

The apparatus is made in three forms, a switchboard type, a pillar type, and a bulkhead type. The pillar type, as shown in fig. 3, consists of three sections, the top case A, intermediate box B, and pillar C. In the top case the control gauge D, main-current solenoid E, relay coil F, and fuses G are situated, mounted on mica covered rods H, which are secured to vertical bars fixed to the casing A. The front of the case is covered by a door secured by eye bolts and thumb nuts, two of which act as hinges. The main cables are led up the pillar C, and are fixed to the terminal block J, and the ends of terminal bars K, held by the top and bottom coil supports L. The case is insulated from the terminal bars by the ferrules M, and from the smaller wires by ferrules N. A large door O is fitted to the intermediate box B for easy access to the cable connections.

When the apparatus is used in connection with alternating currents the main solenoid is comparatively light, and the intermediate box B is used to house a transformer.

The apparatus is connected across the generator terminals so that it is always in operation and independent of the main switchgear; the power required to operate it is 50 watts.

A switch is mounted on the gauge board, and is so connected that when open it breaks the relay circuit, thereby causing the air inlet valve to be held full open when it is desired to charge the starting receivers.

Where this automatic blast control apparatus is fitted to Diesel engines very important advantages are obtained, among which the following may be particularly mentioned: Smoother running; saving of fuel on variable loads, as the control reduces the power absorbed by the compressors, and com-

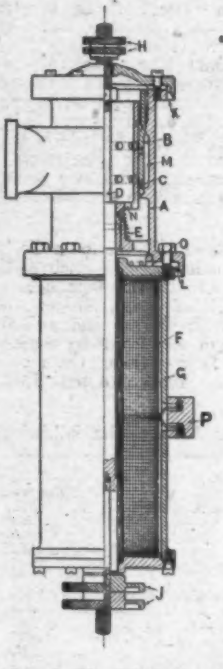


Fig. 2.—Arrangement of Air Inlet Valve.

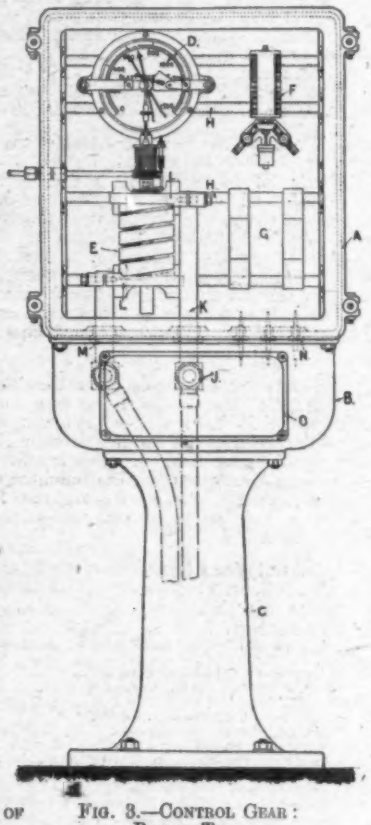


Fig. 3.—Control Gear: Pillar Type.

plete combustion is more uniformly obtained; less attendance; less attention to exhaust valves, due to the complete combustion of the fuel at all loads, which ensures a clean exhaust; blast bottle dispensed with, a small separator being inserted in the pipe between the H.P. delivery from the intercooler and the blast distributor on the engine; parallel running of alternators facilitated; at sea an engine, as in the case of plants supplying current for lighting and wireless telegraphy, may be run after the engine-room has been abandoned.

Although this apparatus has so far only been fitted to Mirrlees-Diesel engines, it is applicable to all makes of Diesel engines.

WAR ITEMS.

Lord Balfour's Committee.—Lord Balfour of Burleigh's Committee on Commercial and Industrial Policy After the War held a further sitting last week.

An Undertaking Repudiated?—In the "Times" for November 10th there appears a letter from Sergeant W. M. Ronaldson which certainly calls for reply from the Falkirk and District Tramways Co. From the statement itself, and from a letter from the company that is published along with it, it appears that Sergeant Ronaldson left the company in August, 1915, to join the Colours, and it was understood that his position as traffic superintendent was to be kept open. The directors under date October 3rd have written to him stating that as no one really anticipated that the war would continue so long, and as there are no signs of it coming to an end, they cannot keep the position open any longer, and will have to make a permanent appointment. As the *Times* points out, any general repudiation of this kind would undermine the whole feeling of security in which a large part of the Army went to war.

Trading with the Enemy.—The "London Gazette" for November 9th contains names of additional firms in the following countries with whom trading is prohibited:—Argentina, Paraguay and Uruguay, Bolivia, Brazil, Central America, Chile, Colombia, Netherlands, Netherlands East Indies, Norway, Peru, Spain, Sweden, and Venezuela.

Electrical Workers' Bonus.—With reference to the Skilled Time Workers' Wages Order, and the Ministry of Munitions explanatory circular M.M. 165, dated October, 1917 (see Elec. Rev., October 26th, p. 394, and November 2nd, p. 419), the Ministry has now issued a further circular specifying the occupations of scientific instrument maker (metal), and electrical fitter, as among those entitled to the bonus of 12½ per cent. if the men satisfy all the conditions of the Order. Skilled men in all the occupations that have been mentioned are covered by the Order, whether working in ferrous or non-ferrous metals. Only those skilled men in these occupations who are paid at or above the current district time-rate for turners and fitters are covered by the Order.

Works War Savings Association.—The Faraday Works War Savings Association, formed among the staff and employés of Messrs. Gent & Co., Ltd., Leicester, held their first annual meeting on November 8th. The secretary's report of the year's work showed that there were 140 members on the books out of 200 employés. Cash collected amounted to £750, making a total of 980 certificates purchased. The Association commenced with a membership of 60, which has been steadily increasing, thus showing that the idea, as elsewhere, has "caught on." Interest was stimulated as a result of the meeting, and 10 new members joined on the following Saturday.

Silvertown Employés' War Funds.—The Silvertown Co.'s Employés' War Relief Fund now totals £1,800. Each £100 collected is distributed as follows: £75 to the British Red Cross Society, £15 to the Serbian Relief Fund, £10 to the Anglo-Russian Hospital (Petrograd). In March last a War Savings Association (for the purchase of certificates by weekly contributions) was started by the India-Rubber Co.'s employés, and has been very successful. There are now 1,020 members.

Subscriptions to the German War Loan.—The following subscriptions, among others, are reported to have been made to the seventh German War Loan:—

A.E.G., Berlin	£500,000
Dynamo Brushes Special Works, P. Ringsdorff, Mehlem	8,700
F. C. Guilleaume, Cologne	150,000
Theodor V. Gilleaume, Cologne	125,000
Felten & Guilleaume, Carlswerk	200,000
Emag., Electrical Measuring Instruments, Apparatus, and Switchboards Co., Frankfort-on-Main	7,500
Heddernheim Copper Works & South German Cable Works	100,000
Continental Caoutchouc & Gutta-Percha Co.	375,000
L. Schwartzkopff, Berlin	250,000
Saxony Light & Power Works	175,000
Voltohm Rope & Cable Works	50,000
Electrotechnical Works (late Strecker & Co.), Offenbach	5,000
Rheinfelden Power Works	12,500
Electrotechnical Works, Offenbach, A.M. (late Schroder & Co.)	
Max Schorch & Co., Rheydt	100,000
Siemens-Schuckert Circles, Nuremburg	750,000
Cassirer & Co. (Cable Works), Berlin	75,000
Richter Electricity Co. (Weil & Co.), Frankfort-on-Main	10,000
Siegerland Electricity Works	10,000
Rheydt Cable Works	75,000
Electricity Co. (late Lahmeyer & Co.)	100,000
Lech Electricity Works, Augsburg	10,000
Telephone Apparatus Works, E. Zwietusch & Co., Charlottenburg	15,000
Lower Silesian Electricity & Tramway Co.	10,000
Voigt & Haeffner	50,000
Saxony Tramway Co., Plauen	10,000
Ludwig Sudicatis & Co., Berlin (Berlin Telephone Works Group)	75,000
Telephone & Telegraph Construction Co., Frankfort-on-Main	25,000
C. Lorenz & Co., Berlin	100,000
Eupen Cable & Rubber Works Co., Eupen	15,000
Insulated Wire Works Co. (late Vogel), Berlin	15,000
Deutsche Incandescent Gas (Auer) Co., Berlin	200,000
Telephone Apparatus, Cable & Wire Works Co., Nuremberg	15,000
Purchasing Association for Electrical Requirements, Frankfort-on-Main	7,500
Accumulator Works Co., Berlin and Hagen	125,000
Land & See Cable Works Co., Cologne-Nippes	25,000
Hartmann & Braun, Frankfort-on-Main	50,000
Hermann Gradenwitz's Electric Motor Works, Berlin	7,500
Kempen-Rhein Electrotechnical Works	7,500
Hartmann & Braun (Officials and Workmen of), Frankfort	5,900

Foremen and Draughtsmen and the War Bonus.—The following letter, received by the London Association of Foremen Engineers, speaks for itself:—

"Ministry of Munitions of War,
6, Whitehall Gardens, London, S.W. 1.
November 12th, 1917.

"Sir,—I have to refer to the interview with you on November 9th and previous interviews with regard to the remuneration of foremen in controlled establishments.

"In reply, I have to state that the Minister has no power, under the Munitions of War Acts, 1915 and 1917, to make any award applicable to persons in receipt of an upstanding salary, and it is contemplated that, in the first instance, employés should negotiate with their employers in the ordinary way, and endeavour to arrive at an agreement, which should then be submitted to the Minister for consideration. In the event of deadlock or failure, it is open to either party to refer the matter to the Ministry of Labour (Chief Industrial Commissioner's Department) as a difference under Part I of the Munitions of War Act, 1915.

"With regard to the 12½ per cent. bonus which has been awarded to time-workers under the Skilled Workers' Time (Engineers and Moulders) Wages Order, 1917, I have to state that this Department would be prepared to consider an advance to the foremen and draughtsmen in receipt of emoluments not exceeding £250 per annum, provided that they are not in receipt of a bonus on output, and proposals which have been agreed between employers and employés with regard to this should be similarly submitted to the Minister for his consideration.—I am, Sir, your obedient servant,

(Signed) Edgar Davis.

"J. Harrington, Esq.,
London Association of Foremen Engineers,
85, Salisbury Road, Harrow."

Exemption Applications.—The Fulham Board of Guardians applied to the Local Tribunal for the renewed exemption of an engine-driver and electrician, aged 27, married. It was stated that the man was responsible for the maintenance of the electric plant at the workhouse, which is now being used as a military hospital. The Tribunal granted four months' exemption.

At the Cromer Tribunal, Messrs. Edmundson's applied for a mains foreman and general assistant, employed at the electricity works, aged 35, married, and classed A. He has been engaged in a similar occupation for 14 years. Conditional exemption was asked for on the ground that he was essential to the carrying on of the undertaking. He was in a certified occupation. No previous application had been made for him; he had been previously badged, having been lent by the Cromer branch of the firm for Admiralty work. Mr. Kerr, for the Military Authorities, contended that when he was lent to the Admiralty for a time the firm did very well without him, and the question was, could not they spare him now? The manager said he had no other reliable man to attend to the mains. While this man was with the Admiralty another took his place, but he left in January, and that was the reason why the man appealed for now was brought back. If this man was taken he had no-one to attend to the mains. He had to do it himself last year from January to June. The Chairman said it was absolutely essential to the convenience and welfare of the public that there should be someone who was capable of dealing with accidents. He put it to the military that unless an efficient substitute could be found the interests of the town would be very much prejudiced by the man being taken. He ought not to be taken away from the town until some other man was able to take his place and do the work he was now doing. The Tribunal granted conditional exemption, the Chairman remarking that that decision did not prevent the military authorities bringing up the case again if they could find someone in a lower category qualified to take his place.

At Northampton Tribunal, E. Goulston, 39, category A, electrical engineer, applied for exemption. He said he had been 15 years in business, and would have to close if he was sent into the Army. He was solely responsible for the maintenance and repair of the X-ray, medical, and surgical apparatus, and the electrical installation at Northampton General Hospital, and for the electrical installation and apparatus at Northampton School Clinic. Six months' exemption was given.

At Rugby, a tester at the B.T.H. Co.'s works, who is of Russian nationality, aged 20, and in Class C 2, was exempted until March 1st in view of the importance of the work he is engaged upon.

At Weymouth exemption was applied for, for W. S. Beale (26, C 2), stoker at the electricity works. It was urged that the man's occupation was most important, that the staff at the works was greatly reduced, and that there was great difficulty in maintaining the works. With the Military assent conditional exemption was conceded.

Before the Hants Appeal Court, the Military appealed against exemption to January 30th given to the assistant to the electrical engineer at the Winchester Corporation Works. He is 18, and the Military Representative said that the services of so young a man in Class A should be available for the Army at once. It was stated that time was required to train a substitute. The appeal was allowed, the calling-up being fixed for November 29th.

An electrician (31, B 2), appealing at Sutton (Surrey), stated that he was the only one left to carry on the business. The appeal was respited for a month, with a view to substitution.

At East Grinstead, Sir G. L. Eyles, The Croft, appealed for C. W. Hollingsbee (33, C 3), electric light attendant, and, with the Military consent, he was exempted until March 4th.

At Chichester, three months' exemption was granted to an electrical engineer and contractor (36, Class C 2), and a final month to an electrical wireman and fitter (24, C 3).

Before the Herts. Appeal Court, exemption was claimed for W. H. Marter (35), electrician at Stanborough Park, Watford, who is in charge of the plant of the International Tract Society, Ltd. The appeal was dismissed, the calling-up being suspended until January 1st.

At Windsor, Mr. H. Fowler, electrical engineer, appealed for F. G. Isgrove (18), his apprentice. Mr. Fowler is serving in the R.N.A.S., and it was urged that if Isgrove had to

join up great hardship would ensue, as there would be no skilled person to take Mr. Fowler's place in the business. A medical examination was ordered.

At Whitby, Mr. J. W. Piggott, electrical engineer to the U.D.C., appealed for an electrical apprentice (18), to enable him to train a 17-year-old youth to take his place in the substation, and temporary exemption until March 1st was granted.

At Gloucester, an electrical engineer (40, B 1), carrying on business in the city, was conditionally exempted on becoming a Special Constable.

At Tunbridge Wells, Mr. Powell, electrical engineer, appealed for A. T. Spurrell (C 1) and A. E. Hills (B 1), electric light wiremen. The former was refused exemption, with the calling-up on January 1st, and Hills was exempted until a suitable substitute is found, he to join the V.T.C.

At Rochdale, on the recommendation of the Advisory Committee, exemption until March 31st has been granted to R. Rhodes (39, C 2), blacksmith's striker, appealed for by the Corporation Tramways Committee.

At Brighton, the Corporation tramway department appealed for 31 men—a traffic superintendent, four traffic inspectors, five skilled mechanics, a night foreman, and 20 drivers. It was stated that 239 men had left the service for the Colours, and that the engineer was opposed to women drivers of trams. The Tribunal granted four months' exemption. In the course of the hearing, Mr. W. Marsh, the engineer and manager, said that since the last appeal there had been a very bad tram accident at Dover, in which 11 people were killed on the spot. The accident was due to a driver losing his head. He was a discharged soldier, and had suffered from shell shock. Many of the men now driving at Brighton were returned from the Front, but discharged soldiers were not coming forward, as they could not stand the strain. The Brighton system had been open for nearly 16 years, and they had never had a bad smash, but if they put inexperienced men on he would not say what the consequences would be. It would not be safe to put women drivers on the many steep hills of the town. He was employing women in the sheds on heavy and dirty work, and they were keeping to it, but he would not have women drivers. The track was bad, but they had so few men to work on the tracks. They did not want a second Dover. They had some drivers who had stiff legs; they were all right otherwise. If the right foot and leg were all right the men were capable, assuming their general health was satisfactory, to drive a tramcar. The brakes were worked with the right foot.

LEGAL.

Electrolytic Corrosion of Telephone Cable.

An interesting case was heard by his Honour Judge Hugh Sturges, K.C., in the Blackpool County Court, on November 7th. The action was brought by the Postmaster-General against the Blackpool and Fleetwood Tramroad Co., Ltd., claiming the sum of £16 18s. as damages alleged to have been caused to a telephone cable by a leakage of electrical current from the defendant company's lines.

Mr. Ross Brown, for the plaintiff, remarked that although the amount of the claim was a comparatively small one, a question of liability was raised which both parties desired to have settled. It was contended that, under the Telegraph Act of 1878, the Postmaster-General was entitled to have made good any damage caused to the cable by the defendants or their agents. The defendant company had constructed and ran a tramroad between Blackpool and Fleetwood, on the overhead trolley system. The current, after feeding the car, was supposed to be conveyed back to the generating station by means of the tram-rails, but, probably owing to the imperfect bonding of the line, a leakage of current had taken place. The telephone and telegraph cables of the Postmaster-General run practically parallel with the defendants' line, and the leaking current attacked those cables, corroding the lead sheathing, and resulting in a breakdown of the cable, and, consequently, an interruption of telephonic communication. Owing to corrosion alleged to have been caused by the leakage of current near Red Bank Road, Bispham, a length of 52 yards of cable had to be renewed, and it was the cost of this work which was now sought to be recovered. Mr. Ross Brown read correspondence which had passed between the parties, in which the defendant company pointed out that the tramroad was laid in 1898, while the Post Office cable was laid only two years ago. Mr. Ross Brown admitted that the Post Office were second comers, but he contended that this fact did not invalidate the claim. The defendants suggested that the cables should be bonded to the tramroad lines, and the Postmaster-General replied that he was agreeable, if the defendants would agree to bear the costs. The bonding was done, and the cost was included in the account.

Mr. Edwin John Hammond, engineer, gave evidence as to testing the leakage in July of last year, which, he said, was 5 volts maximum, with a 2 volts minimum, and the latter leakage would be sufficient to cause electrolysis. If the defendants' line had been perfectly bonded the line would have been the easier path for the current to travel back, with very little leakage to the plaintiff's cable. In any case, there might be some slight leakage.

Mr. William John Rolfe, executive engineer for Preston district, spoke as to tests made which showed that the current was leaving the rails for the cable, with a damaging effect on the latter.

Mr. Ross Brown: Why was the cable not bonded to the rail in the first instance?

The Witness: It is most unusual to bond a Post Office cable with private property, as in certain cases it might be dangerous.

Answering Mr. Wingate Saul, for the defendant company, the witness said that at certain points the cable was only 7 ft. from the defendants' lines. He did not think notice was given to the defendants of the intention to lay the cable, but this was not necessary, as the cable was laid along the public highway.

Mr. John Cameron, the secretary and manager of the Tramroad Co., said the line was perfectly bonded throughout. The line was tested weekly, and returns made to the Board of Trade every six months which showed that it was in a satisfactory condition and complied with the regulations. He was present when the test was made by the Post Office people, and was told that there was a leakage of from two to five volts. There were, however, other cables in the locality; the public lighting cable was within 30 to 40 ft. of the Post Office cable.

Replying to Mr. Ross Brown, the witness said the position the defendant company took up was that the Postmaster-General, by placing the cable near the tram-lines, took the risk of stray current injuring the cable, and should have taken steps to prevent it.

Mr. Wingate Saul said the defendants had not committed a breach of the regulations; and he submitted that there was nothing to entitle the Postmaster-General to succeed in that action. They were in the same position as a railway company with reference to sparks from the engine, and were not liable for any damage that might happen from an escape of electricity from their tramways. The arguments of Mr. Ross Brown referred to works of construction or to telegraph lines that were in existence when the lines were constructed. This cable was placed within 7 ft. of the company's rails, and after the latter had been constructed a period of some 16 years. He urged that it would be an injustice to make the Tramroad Co. liable for the damage to the cable.

His Honour intimated that he would reserve his decision, and would give it at a later Court. In any case he would give costs on the higher scale, and would give leave to appeal.

An Electrical Engineer's Calling-up.

Before the Tipton (Staffs.) Magistrates, last week, Leonard A. Jones (23), an electrical engineer in the employ of the Smethwick power station, was charged with being an absentee under the Military Service Act.

The Representative of the Military Authorities said that the man received his calling-up papers on October 5th, but they were sent back, and his employers applied for his retention. The application was, however, out of date.

Defendant produced a letter from the Dilution Officer to the effect that he would be retained.

The Representative of the Military said that letter was written after the date of the calling up.

A Representative of the firm, and an officer of the Aeronautical Department, said the defendant was indispensable at the power station. He was a highly technical man, and as 95 per cent. of the output was required for munition making, the former said he would not be responsible for the running of the station if the man were taken away.

The Military Representative: I should be responsible.

The Representative of the Aeronautical Department said he had authority to appear to ask that the defendant should not be sent into the Army. A technical blunder had been made.

The Officer for the prosecution replied that he had the authority of the War Office.

The Chairman said it appeared to be a case that the Military Authorities must settle between themselves, and to enable them to do that the case would be adjourned for a week, defendant being admitted to bail to enable him to attend to his work in the meantime.

Hall v. Pordes.

Mr. Justice Bray and a special jury, last week, heard an action for wrongful dismissal brought by Clement Hall, a metal worker, of Birmingham, against Bernard Pordes, electrical goods manufacturer, of Christopher Street, E.C. Defendants denied liability, and said they were justified in dismissing the plaintiff because he was incompetent and did not obey the orders of the firm.

Plaintiff's case was that he was in a responsible position as a metal worker in a well-known Birmingham firm for 25 years, and then joined in a partnership to work on his own account. Defendant was in the wholesale electrical lamp trade, which, until the outbreak of the war, was supplied from Germany with these lamps. As it became necessary to manufacture them himself, he placed orders with the firm which plaintiff had joined, and then appointed him his manager in London to make the cases for lamps, setting up a special department in the London works for that purpose. The business was successful, and some 10,000 to 12,000 lamps were turned out weekly. Plaintiff was engaged under the agreement for five years at £3 10s. a week and commission. After two years' duty defendant summarily dismissed him, and he asked for damages.

The jury found a verdict for plaintiff for £440 and costs, and his Lordship granted a stay of execution, and gave judgment accordingly.—*Birmingham Post.*

CORRESPONDENCE.

Letters received by us after 5 P.M. ON TUESDAY *cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.*

The E.T.U. or the A.E.S.E.?

Referring to the letter of Mr. J. R. W. Grainge in your last issue I may say that at a recent meeting of the E.T.U. the members were advised that the Government and the military authorities could no longer be "awanked," and that if they wished to keep out of the Army, as strikes were illegal and their funds would be confiscated if they suggested one, it would be better for them to refuse to work any overtime after they had done the recognised number of hours. This would spread the jobs out and impress the authorities (it was hoped) with the vast amount of work that the wiremen and their mates were doing. This advice elicited from the body of the hall the opinion that if the members refused to take a few extra shillings per week in the form of overtime, which they admitted among themselves was very rarely, if ever, earned, the small amount saved on isolated jobs would not be sufficient to warrant the employment of one or more of their unfortunate brothers who were of military age but not actively employed. The aim of this new programme of the E.T.U., so far as station men are concerned, appears to be based on a new trade card which they are attempting to force on the industry, coupled with total exemption from the Army, &c. Many of the station men present clearly did not approve of the way that the meeting was being conducted, or the nature of the business in hand, and a spokesman on their behalf challenged the Committee with the fact that they had been enrolled as members of the E.T.U., with the above programme as an inducement to join, and after six or nine months' negotiations nothing had happened to benefit them to the slightest degree. It appeared also from the remarks that had been previously made in their hearing that original members, at all events in so far as military service was concerned, were not to much, if to any extent, receiving that protection which had been promised them. The Committee were therefore challenged by the station engineers' spokesman to bring about a conference with the Ministry of Munitions with a view to settling their grievances.

The result of that conference and other matters arising have since been published and discussed very fully in the trade Press.

One who was Present.

I would be glad if you will grant me space to point out to Mr Healy that my letter was not written for the purpose of shelving problems or obscuring issues. I desired to make known, what is already quite clear to those outside the lofty domain of power station service, that nothing is gained from wage or salary payers unless it be striven or fought for; and that any organisation framed for making the lamb bed-fellow to the lion, inevitably ends in the former's extinction.

Incidentally, it occurred to me that smaller power stations may possibly be devoured when the centralisation monster begins to grow, and that this event may force the responsible shift men in these important places to compete for employment hitherto reserved for those lower-grade individuals, who, in an organising sense, are so naturally catered for by a vulgar body like the Electrical Trades Union.

No! "C.B.T." (A.M.I.E.E.) your hopes are vain; but I have an awkward feeling that it is more dignified to be included in an organisation which is energetic enough to force vital issues (even in war time) than it is to remain a bickering "free lance" or, say, a member of a mutually congratulating, snobbish circle, which snatches the good things but abuses those who get them.

W. F. K.

Your footnote at the bottom of Mr. Grainge's letter is to me a command. Your courtesy is a model to editors. For the last 10 years or so "spasms" bearing my name have appeared in the columns of your paper. Any comments by you have always borne the imprint of fairness and tolerance, and one only wishes all papers were run on the same lines. I have the reputation among my friends, and my enemies, of saying what I think, and I honestly thank you for your kindness to myself. I have never, to my knowledge, met either of you, but hope to have that pleasure some day, and thank you personally.

Now, Mr. Grainge, you must, I think, be a politician, as you have got the usual politician's trick of culling extracts from speeches or writings, and giving them an importance which possibly, if they were taken with the whole, they would not possess. If Mr. Grainge had been a regular reader of the *Electrical Trades Journal*, he would have known why the paragraph quoted was penned. "Our slogan, &c.," was a portion of the London District Committee notes written by myself for our September issue, and, rightly or wrongly, represents the feelings of my Committee and our Union. The reason, too, is plain. Over 12 per cent. of our membership are serving with His Majesty's Forces to-day, and 90 per cent. of that number are in Line regiments where their technical knowledge and ability are absolutely wasted. I, together with our General Secretary, attended last January a meeting, called by the Government, of the skilled engineering trades. We were addressed by Lord Derby, Dr. Addison, General Geddes, and others, and they wanted skilled men for technical corps. Our General Secretary and myself said they could not have any, as we could not supply the demand for skilled electricians at home. Our General Secretary said he had forwarded to the Ministry and the Army authorities the names of hundreds of our members who were in Line regiments, and had asked for their return to civil employment, or their employment in units where their talents would be most useful to the nation. Representatives of other trades also quoted cases of a like nature, amounting in the aggregate to a large number of thousands.

We had promises galore given us that the matter would be rectified. Such promises have not been kept. Here and there a man has been brought back, amounting in the ultimate to less than 5 per cent. of the total.

Every day I have numerous inquiries from employers and Government Departments for skilled electricians, and cannot supply them. Have had to draw hundreds of men from less important and put them on more important work. Yet all the time the Army Authorities are chasing our members; and if any of them go, they are almost invariably put in line regiments. Absolutely one of the best mechanics in London was for nearly two years a telephone room orderly. Another for six months was picking up the litter in the barrack square. Only to-day, Saturday, November 10th, a member came into the office. He is nearly 21, served a five years' apprenticeship with one of the largest firms in Manchester, and is now a first-class electrical fitter. He had a Protected Occupation Certificate, but thought he should do his bit. He was sent to Woolwich for his trade test, and passed with flying colours. He was then sent to Farnborough and passed another trade test for the Flying Corps. He has been drafted to a line regiment at Reading. If I get him put in a technical corps, it will mean writing to half a dozen different people, and before any decision is come to he will probably be in France or Italy—possibly dead.

You will quite understand we had to call a halt. We had to say to the Government, "Hands off our members." We had to say, "This is an electrical engineers' war; and although you are able to teach a woman in a day how to stand by, or rather work, a capstan lathe, you cannot make electricians in a day or a year."

We are fighting for our Union and the industry, and are following the lines of the three strongest Trade Unions in the land to-day. There are quite a goodly number of men of military age in the legal profession, and I really think Haig or Jellicoe would rather trust one electrician to blow the Germans to glory than all the lawyers to talk them there.

Then there is the Medical Trade Union. They threatened a short time ago to "pull" all their members from France if any more of their number were taken. Of course, it was not a strike; it was only the threat of one, but it was effective. Plums fall into their lap, too, without striking—witness the £800,000 gift of insurance money, of which the working-class was fleeced.

The Church of England Trade Union is also fairly strong. Strong enough to resist conscription and also dilution. There are no women parsons; oh, dear no! They are not doing so badly out of the war either. They get increases of wages, too (tithes, &c.), without going to the Committee on Production.

So you see, Mr. Editors, we are sinning in "good" company. We, in ten years' time, are going to be the fourth strongest Trade Union in the land. We are going to control the electrical industry; but, unlike the others, we are going to control it in the national interest.

As I have taken up so much of your space, I cannot deal very lengthily with Messrs. Jones and Napier. Let me say here and now, the A.E.S.E. does not out any ice with anyone. About five years ago an article appeared above my name in the ELECTRICAL REVIEW. I was writing as a member of the Electrical Trades Union, and I said I did not care what the station engineers did as long as they organised. We, the Electrical Trades Union, stood aside and gave Mr. Ebben a clear field, and also assisted him, but it was of no use. The will to do was there, but the ability evidently was not, so we had to take the work up, and so successfully that in London alone we are over 1,000 strong, and still Charlie's Aunting.

Poor Mr. Napier! If he has any doubt to whom he is indebted for his increase of wages, I should suggest that he has five minutes with Mr. James Devonshire.

W. J. Webb,
London District Secretary.
Electrical Trades Union.

London, E.C.,
November 12th, 1917.

P.S.—By the way, I am wondering if Mr. Grainge is of military age.

In reply to Mr. Napier's remarks in REVIEW of November 9th, he challenges me to give him the name of a member of the staff who is also a member of this organisation. Surely he does not admit such an elementary knowledge of Trade Unionism as to not be aware of the fact that one of the primary objects are protection to members.

He charges me with misrepresentation concerning the North Metropolitan Award. Why, then, does he not prosecute this Society for publishing a fraudulent award? Surely, being such an important person, he has that power. He states that the question of bonuses was already under consideration; probably, but what accelerated the consideration he does not say. Happily, men of Mr. Napier's calibre are rapidly disappearing, otherwise the industrial outlook would require more than a Commission of Industrial Unrest to cope with it. The days of intimidation by such tactics are, thanks to organised labour, over, and we look forward to a period of mutual understanding which will ultimately work out to the betterment of relationship between employer and employed.

H. H. Morton, *Secretary,*
No. 1 London Branch Station Engineers.

I am desired by the members of the Marylebone Branch of the National Amalgamated Union of Enginemen, Firemen, and Electrical Workers to state that it is one year and three months since they commissioned Mr. Meakin, their London agent, to investigate the wages and conditions of the London and suburban power stations with a view to securing substantial improvement. This branch has never displayed hostility towards any Trade Union catering for gas, water, or electricity employés, and would advise all such unions to compose their differences. All the members of these unions are travelling along the same road, and far better for all there should be harmony and close co-operation.

Until Mr. Meakin took up the matters referred to with the electrical engineers, nothing was done on a large scale; and whatever benefits are being received now by engineers or workmen are directly traced to those small beginnings of 15 months ago. As a matter of fact, the E.T.U. did not wake up to the full sense of responsibility until a question was asked in Parliament on behalf of three certain members of the Marylebone Branch of the N.A.U.E. And the station engineers seem to have held aloof from their comrades in the power stations. The N.A.U.E. has tried to benefit all employés, whatever their grade and station, for sectionalism is no good.

J. Vincent, *Branch Secretary,*
National Amalgamated Union of Enginemen, Firemen, &c.

London, N.W., *November 12th*, 1917.

[The moderation and restraint of Mr. Vincent's letter compel our respect. On the other hand, we have received some letters from other quarters, the contents of which, as is too often the case in such controversies, consist largely of personal references bordering upon abuse; such letters in no way contribute to the solution of the difficulties of the situation—rather they accentuate them—and on this account, as well as the pressure on our space, we refrain from printing them in this column.—Eds. Elec. Rev.]

The Association Movement.

Association is the nucleus of co-operative effort. Herein then we have the promise of a final emergence from the slough into which the design of capitalistic power has managed to throw our generation. That being so, it seems a pity that the contribution published in your last issue, on the leader entitled "The Association Movement," should reject the idea for the instance, and so clothe the C.M.A. with an importance which the political structure of the new influence would belie.

The movement with its pregnant tissues floating loose, as it were, awaiting the masterly tying of a logical knot, is liable to lose the inherent values that lie in its conception, unless handled broadly, with an eye to the body economic.

It is a natural consequence of the war in which we are so vitally engaged, and as such, should be studied, not on the basis of a past adventure, but on its own merits, as significant of a certain tendency of thought, drawing life from the mutation of the industrial ideal that this strife is responsible for.

The mutation of which I speak, is not a something apart—a revelation complete in itself—but only a fragment thrown up by the moral convulsions of the universal mind. It holds in itself possibilities that affect the well-being of the individual, as well as of the mass, and presented more or less as a novel device, the association movement is in truth but an indication that a different phase of State representation—as far as the engineer is concerned—is at hand.

My inferences from France may be judged abnormal, and perhaps theoretical, but when considered in conjunction with the Whitley Report and the Government's definite statement, that "it will give preferential consideration to industrial organisations, in the councils of which labour has its representatives," we see at once that we are dealing with a combination of interdependent facts, rather than a detached link broken off from a chain.

Abstract though the study may appear to be therefore, it is nevertheless essential that the engineer, on the verge of having new and wider functions added to his already important, though somewhat limited, responsibility, in the guiding of the ship of State, should analyse such indications as the association movement for what they are worth.

It is obvious that the Government is seeking to direct part of the scientific brain into a new channel, wherein the labouring proletariat will have a more regulated voice than hitherto. It is not a case of socialism, but rather an endeavour to find a mutual basis, whereon both the aristocrat and the workman of the technical world may meet, and fuse their respective efforts towards the national well-being of a strained community.

The time has come for the engineer to add—very seriously—economics to his list of necessary subjects.

Viewed in this light, I feel it were well to take the substance of the association movement as a whole, and not as the somewhat belated shadow of a single—howbeit successful—forerunner.

R. C. Andersen,
B.E.F.

November 4th, 1917.

Referring to a letter which I wrote you on October 18th as to a claim put forward by Mr. H. H. Berry to be the founder of the Cable-Makers' Association, and having in view his letter of October 23rd, replying to my letter, it appears necessary to make a short further statement on the matter, which is one, probably, of so comparatively little interest to the majority of your readers, that I will not occupy your columns at great length on the subject.

At a recent meeting of the Cable-Makers' Association, at which were present five individuals who took part in the first meeting of the Association, besides others who were closely associated with the foundation, Mr. Berry's letter, and also my letter, were read.

I am authorised to state that, in the opinion of those present, my letter of October 18th correctly sets out the position. It is not in dispute that Mr. Berry called on members of the cable trade in 1898, putting forward his views as to the desirability of founding an Association; but at the date he did so, preliminary action had already been initiated by others, and there is universal agreement among those who took part in the foundation of the Association that the putting forward by Mr. Henry Edmunds of certain definite constructive proposals was the step that made possible the formation of the Association, and there never has been any question in their minds that this gentleman was, in fact, the founder of the Association, so far as any individual can claim that title. Lieut. F. S. Paterson, who was present at the first meeting, in his letter to you of October 29th, 1917, independently bears out this view.

I may conclude by saying that, personally, I do not intend to continue any further this correspondence.

The Cable-Makers' Association.
Llewellyn B. Atkinson, *Secretary.*

London, *November 13th*, 1917.

BUSINESS NOTES.

Packing Scientific Instruments.—Mr. R. W. Dalton, H.M. Trade Commissioner for New Zealand, complains of the unsatisfactory packing of scientific instruments sent from the United Kingdom. Though allowance is to be made for the present difficult situation in respect of packing, it is felt that proper care is not being taken. To poorly pack expensive scientific apparatus is like losing the ship for the sake of a little tar. Cases of breakage are quoted by Mr. Dalton. At present, no doubt, packages are being subjected in transit to exceptionally rough treatment, and it is suggested that makers should wherever possible send the cases to the ship by hand and put them into the safe custody of the Chief Officer for special stowage, after making proper arrangements with the shipping company.

Trade with Venezuela.—The British Vice-Consul at Maracaibo has reported on the prospects of developing our trade with Venezuela. There should be great prosperity when the termination of the war opens the trade channels for imports from the United Kingdom, but the market requires special studying, as for the past 20 years it has been dominated by Germans. We have been seriously handicapped in the past by the lack of suitable advertising matter for probable buyers. Catalogues must be in the Spanish language and must state terms and prices. Suitable catalogues should be sent to the Vice-Consulate at Maracaibo and they will be distributed among likely buyers. There is a good demand for marine engines for pleasure boats, electrical equipment and general machinery, also hardware. At present the bulk of the hardware is being imported from the U.S.A., Spain and Italy. The Vice-Consul expresses the opinion that the present time offers an admirable opportunity for our firms to be active; no doubt if there be any of them free to cultivate export trade in this market they will take the hint.

L.C.C. Stores Contracts.—The L.C.C. Stores and Contracts Committee reported on Monday that the current contracts for the supply of general stores, with a few exceptions, would expire on December 31st, and they were taking steps for obtaining supplies for 1918. The group of contracts affected includes metals and metal goods, electric cables, lamps, fittings and materials, chemical and scientific goods, rubber and asbestos goods, &c. It is proposed, under prevailing circumstances, to continue the present practice of purchasing some classes of goods at the current market rates, or under special quotations, until trade conditions again become normal, or until it is considered favourable to enter into new contracts. In other cases, however, new forms of tender and schedules are being prepared. Tenders will be received during November and December.

Japanese Electrical Deputation to Australia.—We read in the *Sydney Morning Herald* of September 10th that Mr. Keizo Yoshino, Secretary of Electrical Exploitations and the Bureau of Special Investigations, Tokyo, had just reached Sydney on a visit to Australia to inquire into its electrical undertakings, and to find out how Japanese electrical machinery and appliances might be improved to suit the requirements of the Australian trade. Mr. Yoshino said that while Japan was very busy making munitions of war when he left for Australia, the regular industries were flourishing.

In reply to a question, he said that they had had strikes in Japan recently; but they were all very small. "The Government does not allow strikes on a large scale."

The total number of electrical undertakings in Japan at the close of last year was 2,501, including supply, traction, isolated plants, and official plants. At the close of 1915 there were 250 manufacturers of electrical machinery and appliances in Japan. The value of these manufactures in 1915 was estimated at 36,065,739 yen, including machinery, &c., exported to China, India, Australia, and other places.

German Ship Installations.—A company under the title of the Schiffs Installation A.G. has been formed at Bremen with a share capital of £70,000 for the purpose of carrying out electrical installations, particularly on ships. The participants include the Hackethal Wire and Cable Works, the Lorenz Co., the Lloyd Dynamo Works, and two banking institutions.

Austria's Future Export Trade.—According to the *Wiener Zeitung* of October 16th, the Austrian Minister of Trade has issued an Order providing for the formation of a Committee of Experts for the Export Trade, in which not only the regular export merchants, but also other industrial groups specially interested in exports, are represented. In all questions of essential importance the Committee will act in conjunction with the existing Economic Committee of Merchants. The new Committee consists of not more than 45 members, nominated by the Minister of Trade, and is under State supervision, which is exercised by a Government Commissary. Among its functions is that of co-operation in measures for war and transition to peace economy which relate to export.—*Board of Trade Journal.*

Book Notices.—*First Course of Electric-Light Switching and Testing.* Arranged by W. P. Maycock, M.I.E.E. London: A. P. Lundberg & Sons. Price 10d. post free.—This little book should prove useful to teachers of practical wiring and other classes where the connection and testing of tumbler-switch circuits form part of the tuition, as well as to individual students, especially those competing for the firm's Preliminary-Grade Certificate. This "First Course" is of a most elementary nature—in fact, the first exercise deals with the trimming of the ends of flexibles and wires; and in the last, the two-way intermediate circuit is fitted. The work and operations are so minutely detailed that there will be little for the teacher to do except to examine and appraise completed work. A list of apparatus shows him at once what is necessary. The "Hints" on the working-out of problems will encourage the student who is in difficulties, and numerous problems are given for him to solve by himself. The instructors of workshop classes which cater especially for wounded soldiers, should find the simplicity of the course very acceptable to their students.

"Links with the Past" is the title of a very acceptable book, well produced and neatly bound, issued by the Eagle and British Dominions Insurance Co., Ltd. It is a restful recreation to turn from reading about the war to study the charming reproductions from old prints of bits of London in "good old times" and from photographs of those who have been directors of the company in the lengthy period of its history. To read of the old coaching days, to be reminded of the ways of Charles II and Nell Gwynn, to remember the old Fleet Street coffee house of literary men, and many other such matters, all woven into the story of the company's history, is not waste of time in days when stress and anxiety render the mind easily wearied.

"Punch's Almanack" for 1918, published this week, will be on sale at the same price as before, 6d. Its cartoons are of the usual high standard of excellence. Four of them dealing with "Germany and the Next War"—the commercial war in which the Hun faces the difficulties in this and other countries where he has bombed and outraged civilian communities—are quite good.

"British Standard Specification for Charging Plug and Socket for Vehicles Propelled by Electric Secondary Batteries. Report No. 74—1917, of the Engineering Standards Committee." London: Crosby Lockwood & Son. Price 1s. net.—The great importance to the electric motor vehicle industry of a standard charging plug and socket, for use with vehicles propelled by secondary batteries, was brought to the notice of the British Engineering Standards Committee, in 1914, by the Electrical Vehicle Committee of the Incorporated Municipal Electrical Association. After consideration, it was decided to adopt the dimensions recommended by the Electrical Vehicle Association of America, in order that interchangeability should be secured between plugs made in both countries, and the Report was issued in December, 1915 (Report No. 74). Early in the present year the Standards Committee (Electrical Vehicle Division) of the Society of Automotive Engineers of America suggested a small modification in the design of the plug, which they found added considerably to the mechanical strength, and did not affect the interchangeability. The proposal was supported by the Electrical Vehicle Committee of the I.M.E.A., and, after consideration by a Sub-Committee of the British Engineering Standards Committee, the modification was adopted. The revised Report was approved by the Main Standards Committee in July of this year, and is now issued in accordance with the new policy of the Committee in octavo size, price 1s. French, Italian and Spanish translations will be available shortly.

"Scientific Papers of the Bureau of Standards." No. 303. "Relative Sensibility of the Average Eye to Light of Different Colours, and Some Practical Applications to Radiation Problems." Washington: Government Printing Office. Price 15 cents.

Trade Announcements.—All communications for the Coventry electricity department should now be addressed to the Council Office.

Mr. F. W. Fox, electrical engineer, of Bank Street, Ashford, Kent, is relinquishing business.

Liquidations.—Bosch Magneto Co., Ltd.—A petition for the winding up of this company is to be heard in London on November 20th.

R.E.T. Construction Co., Ltd.—Creditors must send particulars of their debts, &c., to the liquidator, Mr. A. Page, 28, King Street, Cheapside, E.C., by November 30th.

Catalogues and Lists.—Messrs. Cole, Marchent, and Morley, Ltd., Bradford.—22-page illustrated catalogue, in expanding binding cover, of the C.M. & M. central exhaust steam engines. The principal points concerning these engines, the advantages claimed, diagram of general arrangement, diagrammatic section of cylinder, and notes on the construction of the engines, are set forth. A number of excellent half-tones show the engines installed for electrical and other work. The horizontal compound type of engine is briefly dealt with.

Messrs. Johnson & Phillips, Ltd., Charlton, London, S.E. 7.—Two leaflets: No. T1/10 shows their new design of portable testing transformer and No. T1/22 their shell-band heating transformer.

Mr. P. W. Rands, Caxton House, Westminster, S.W. 1.—Price list of electrical plant and apparatus in stock for sale.

Messrs. Geipel & Co., Vulcan Works, St. Thomas Street, London, S.E. 1.—20-page illustrated price list, fully describing and tabulating data regarding some standard ranges of their motor-starting and controlling gear, of which immediate deliveries can be given against M. of M. certificate.

Messrs. Ward & Goldstone, Sampson Works, Salford, Manchester.—Leaflet describing and pricing the Sampson acid and water proof lampholder.

For Sale.—The Borough of Eastbourne Electricity Department has for disposal one 150-kw. direct-coupled steam alternator and exciter. For particulars, see our advertisement pages to-day.

British Trade with Italy.—The Headquarters of the British Chamber of Commerce for Italy (Inc.) have been removed to commodious premises at 7, Via Carlo Felice, Genoa, where sample showrooms for British goods are being organised.

New German Cable Factory.—It is stated that the work of erecting the large new cable factory for the Insulated Wire Works (late Vogel), of Berlin, is proceeding so actively that the factory is expected to be brought into operation in the company's present financial year.

LIGHTING AND POWER NOTES.

Australia.—Brown Coal.—Referring to the brown coal deposits of Victoria, the Minister of Mines recently stated that, besides surface coal, it was estimated that at 100 ft. down there were 13 million tons; he believed that 2,000 tons a day would be obtained last month. It is supposed that the State policy will be to generate electricity on the Morwell site from this coal, and transmit the energy to Melbourne, while by-products and briquettes will also be secured, the fuel costs being very much less than in the case of the Newcastle coal now used.

Municipal Hiring Powers.—The Legislative Council of Victoria has had under consideration the Electric Light and Power Act Amending Bill, which proposes to give power to Councils to sell or let on hire electrical fittings, apparatus and appliances. After considerable discussion, a new clause was inserted applying the Bill to the City of Melbourne, but empowering the Governor-in-Council to apply it, in whole or in part, upon application to any municipality. The Bill subsequently passed all stages.—*Melbourne Age.*

The general manager of the Mount Lyell Mining Co. has cabled from America that investigation by three different experts has proved beyond any doubt that the ore from the Mount Read and Rosebery Mines is splendidly adapted for treatment by the electrolytic process.—*Sydney Morning Herald.*

The Premier of Victoria stated recently that the application of the Victorian Hydro-Electric Co. to utilise the Kiewa river for the generation of electricity, and to sell same throughout the State, has been referred to the Special Committee which is at present investigating brown coal possibilities, and whether the future supply of electric power in bulk should not be under the direct control of the State. Consideration of the company's application has been deferred until the Special Committee reports.

The South Grafton Municipal Council (N.S.W.) has received an offer to install an electric supply scheme in the municipality. The proposal provides for the Council taking over the plant to be installed in the event of the Nymbodia river hydro-electric scheme being adopted at a future date. An effort is to be made to ascertain the views of the Grafton City Council on the Nymbodia scheme, which would serve both municipalities.

The West Gippsland Hydro-Electric Co., Ltd., Warragul, Victoria, has been formed with a capital of £10,000. The source of supply will be the Latrobe river, and it is proposed to install a 250-h.p. plant.—*Tenders.*

The Newtown (N.S.W.) Council is to consider the advisability of securing a site for a municipal electric lighting plant. At the last meeting of the Council it was pointed out that the contract for lighting with the Balmain Electric Light Co. would expire shortly, and the Council by having its own plant could effect a considerable saving, the destruction of garbage could be carried out, and the cost of lighting the streets greatly reduced.

Belfast.—The Corporation has appointed a Committee, consisting of the Lord Mayor and ex-Lord Mayor, the chairmen and vice-chairmen of the Improvement, Works, Tramways and Electricity, Public Health, and Finance Committees, to inquire

into the working of the departments under the control of the four first-mentioned Committees and report as to what, if any, changes in duties at present discharged by the departments it would recommend. It is stated that as regards the tramways and electricity department, the inquiry is chiefly for the purpose of ascertaining the desirability of placing the two concerns each under a separate Committee instead of the present system.—*Northern Whig.*

Bettwsycoed.—An eel in the pipe line recently stopped the local hydro electric plant, the electricity supply being shut down for some time.

Birmingham.—Electricity Supply Development.—In acknowledging his re-election, the Lord Mayor (Ald. Brooks) referred to the reorganisation of electricity supply and the proposals which had been put forward to this end. He said the Birmingham Electric Supply Committee had appointed a Special Sub-Committee to consider the problem, and it would report whether the Corporation undertaking could by itself give effect to the aim of the Departmental Government Committee, or whether the object could best be attained by a scheme of development which might comprise a large Midland area of which Birmingham would be the centre, and managed by a joint board representing the various interests concerned. Birmingham must be in the forefront in that development, or it might run the risk of losing its premier position amongst the great industrial communities of the country.

It would appear, from inquiries, that the Birmingham Corporation has already given much consideration to the problem from the point of view of that city's internal requirements, and, in view of the terms of reference, has also had under consideration the question whether the scheme ought not to provide for a supply of electricity to the great industrial area of which Birmingham is the predominant centre. The matter has, in fact, proceeded further than those connected with the Electricity Supply Committee are able to disclose, and important conferences with the Ministry of Munitions are regularly taking place, though nothing definite is settled. One part of the scheme contemplates the linking-up of the existing electricity supply works within the area of which Birmingham is proposed as the centre, while another portion of the scheme takes into account the whole of the electrical requirements for some years ahead in that industrial area, and whether provision should not be made for the erection of one or two huge generating stations upon the best sites, from an engineering point of view, so as to give electrical energy at the lowest possible rate to all consumers. Regarding the problem of control and management, it is pointed out that there are difficulties owing to the fact that portions of the area are not supplied with electricity, while other portions are served only partially and in varying degrees by power companies or municipalities.

Brandon (N. Devon).—Fire.—A fire which broke out at the electricity station, on Monday, caused some damage in the engine room.

Burton-on-Trent.—Price Increase.—It is anticipated that the 10 per cent. increase on electricity charges will add £2,000 to the revenue and about meet the extra cost of coal. Nine years ago slack was obtainable at 2s. 10½d. per ton, but to-day the price is 11s. 1d. per ton.

Canada.—The Hydro-Electric Power Commission of Ontario has refused the city of Niagara Falls (Ont.) permission to build a submerged dam in the upper Niagara River for the purpose of supplementing the city's water supply. It is pointed out that every gallon of water is urgently needed for power purposes. In the meantime the city will be allowed to supplement its supply from the Ontario Power Co.'s conduit.—*Canadian Electrical News.*

Chelmsford.—The Electric Supply Corporation has informed the T.C. that it cannot consent to any further extension of the time during which the Corporation may give notice of its intention to acquire the undertaking, unless some protection is given against the undertaking being transferred at a price based upon its reduced value as a going concern under war conditions. If this protection were given, it would consent to an order being made, extending for two years the time for giving notice, subject to the Council not applying to the B. of T. for a further order. The T.C. has decided to take no further action in the matter.

Chesterfield.—Price Increase.—The T.C. has decided to increase all prices (except those with coal clauses) by 12½ per cent., making 25 per cent. on pre-war prices.

Clayton (Yorkshire).—E.L. Proposals.—At the D.C. meeting, last week, a letter was received from the Electrical Distribution of Yorkshire, Ltd., asking for a definite answer as to the Council's attitude to the company's proposed renewal of application for power to supply electricity to the district. The letter reopens the controversy which took place last year between the Council and a ratepayers' meeting, which demanded that the supply should be obtained from the Bradford Corporation. There are fears in the township that the Bradford offer, which found much favour with the inhabitants, was part of an effort to secure the incorporation of the place with the city. Bradford would, it was stated bring electricity to Clayton within two years after the war under an incorporation agreement. Eventually the Council decided to inquire as to Bradford's terms at present.

Derby.—Price Increase.—The T.C. has decided to increase the charges for electricity by 10 per cent. The chairman of the Electricity Committee stated that at the present time the electricity undertaking was using 30,000 tons of coal per annum, for which it was now paying £11,000 a year more. By the increase of 10 per cent. in the charges two years ago nearly £6,000 a year was produced, or about half the amount of the extra cost of coal. The Council approved a recommendation that £1,500 be granted to cover the cost of land for coal storage.

Doncaster.—Price Increase.—The Electricity Committee recommends an advance in the price of electricity of 15 per cent., making a total advance of 25 per cent. on pre-war charges, as from December 1st this year. An amendment, moved at a meeting of the Council in Committee, in favour of a total 30 per cent. increase, was defeated.

Edinburgh.—Price Increase.—The Corporation Electric Lighting Committee reported that the increase in the price of coal of 2s. 6d. a ton would mean an increased cost to the undertaking of about £4,700 up to May 15th, 1918. The estimates for the year showed a credit balance of about £1,000. Utilising this with the present rates for electricity, there would be a loss of about £2,400 at the end of the year. It was estimated that an increase of ½d. per unit on lighting from October 1st would bring a credit balance of £500 on May 15th, 1918. The recommended increase, which brings up the rate for lighting to 3½d. per unit, was adopted.

Faversham.—The Electric Supply Committee is to report on extensions needed to supply a shipbuilding yard to be established in the town.

Greasborough.—The U.D.C. has decided to oppose the proposal of the Rotherham Corporation to include Greasborough in its area for the supply of electricity.

Huddersfield.—A statement submitted to the T.C., last week, showed that in the electricity department the supply of current to ordinary consumers had had to be somewhat restricted during the past year owing to the demands for power. The Committee was stated to be considering extensions to the plant.

Keighley.—Wages.—The War Wages Committee recommends an increase equal to 15s. per week on pre-war rates of pay of all full-time male employés of the Corporation over 21 years of age—with a few particular exceptions—to be regarded as a war bonus and to replace any bonus previously granted. The bonus is to continue for three months after the declaration of peace.

The Electrical Committee is seeking power from the Board of Trade to disconnect non-essential electricity consumers, in order to concentrate on the supply of important works, if the necessity should arise.

Leatherhead.—The Leatherhead and District Electricity Co. is installing additional generating plant to meet the demand for power purposes, and private consumers are asked temporarily to curtail their requirements in order to assist matters.

London.—L.C.C.—The Finance Committee recommends the sanction of the Council to the borrowing of £4,484 by the Woolwich B.C. for a 1,000-kw. motor transformer.

Manchester.—Wages.—The Corporation is taking steps to oppose an application by the National Union of General Workers and the Workers' Union for an advance of 5s. per week in wages of all workmen of 18 years of age or over in a number of departments, including those of electricity supply and tramways (permanent way). The application is to come before the Committee on Production. In this connection Sir George Askwith, Chief Industrial Commissioner, has written to the Corporation that, having in view previous demands and awards given, and considering the new claims, he will be glad to know if municipal authorities have considered the practicability of making an agreement with the various workers' Unions on the subject of general wages changes on the lines of the agreement existing in the engineering and foundry trades, chemical trades, &c. There is every prospect of all concerned accepting the invitation, though no definite decision has yet been arrived at.

Norden.—Public Lighting.—The Rochdale authorities having agreed to the fixing of electric lamps to the tramway standards, the U.D.C. has decided to have one fixed to every tenth standard.

Nottingham.—Recently a motion by Mr. Atkey, before the T.C., proposed that in connection with the national scheme of reorganisation of electricity supply, it was desirable that the advantages of Nottingham should be placed before the Government as the site of one of the large power stations, and that a Committee be formed to consider the national scheme and report.

Price Increase.—The electricity charges have been increased by 7½ per cent., in order to avoid a loss on the undertaking next year.

The Corporation employés, who have already received a substantial war bonus, are agitating for further advances, estimated to cost £60,000 annually. The Corporation has asked the Government authorities to intervene.—*Times.*

Peterborough.—It has been decided that the Electric Traction Co. shall be charged 20 per cent. extra for electricity, the same as other power consumers.

Rotherham.—Prov. Orders.—The R.D.C. has under consideration proposals of the Rotherham Corporation and the Electrical Distribution of Yorkshire, Ltd., to apply for prov. orders for supplying current for lighting and power purposes.

Sandwich Islands.—According to the *Electrical World*, the Hilo (Hawaii) Electric Light Co. is making considerable progress, having during the year connected 40 electric ranges, 85 water heaters, and about 1,000 socket appliances. 600 H.P. of additional motors have also been connected. The company has ordered a 1,000-H.P. hydro-electric unit, and another water-power development is contemplated. The reconstruction of the street lighting system is being undertaken.

Sheffield.—Price Increase.—Feeder cable is to be laid from Neepsend, at an estimated cost of £4,585. To meet the advance in the cost of coal, all accounts for the supply of electricity now charged at 2d. per unit and under are to be subject to an increase of 25 per cent. in lieu of the previously-decided increase of 20 per cent. The charge is to commence after the December readings. The Parliamentary Committee is advising the Council to confine its application for a Provisional Order to the following districts, viz.:—Handsworth U.D., Wortley R.D., Norton R.D., Dronfield U.D., and the parishes of Coal Aston and Dronfield Woodhouse.

Spenborough.—Proposed Loan.—The U.D.C. has decided to make application for sanction to borrow £8,217 to carry out extensions at the electricity works.

St. Annes.—In reporting on the heavy demands on the electricity works, Mr. Clothier, the engineer, recommends an increase in the steam plant.

St. Helens.—Price Increase.—The Electricity Committee has decided that the charges for electricity for power and lighting be increased as from October 1st, 1917, by 50 per cent., instead of 30 per cent. as hitherto.

Slaithwaite.—Provisional Order.—The Huddersfield Corporation has given notice of its intention to make an application to the B. of T. for a Provisional Order for supply within the urban district.

U.S.A.—The electric display lighting of New York, including the huge advertisements which have made Broadway historic, will in a few days be discontinued, except between the hours of 7.45 and 11 p.m. It is estimated that 125,000 tons of coal annually will thereby be saved.

Walsall.—The Corporation, having completed the new electricity generating station, is making a big effort to attract manufacturing enterprises. It points out that it has a large amount of surplus power, and that the town is on the fringe of the Cannock Chase coalfields.

Wharfedale.—E.L. Proposals.—The Electrical Distribution of Yorkshire, Ltd., are seeking support of the local Councils of Wharfedale to the proposed development of their supply services in the Menston, Burley, and other areas. At a meeting of the Burley-in-Wharfedale Council, last week, it was stated that the company would not agree to a purchase clause, and the Council decided to withdraw its support.

Wolverhampton.—Year's Working.—The annual report mentions that the largest generating set failed, and was out of commission for six weeks, necessitating curtailment of supply. A large new factory took some 2,800,000 units during the year, and its requirements are such that a further 5,000 KW. of plant has had to be ordered, and until available (early next year) the curtailment of supply in certain directions continues. Negotiations have taken place with several large firms which contemplate building works in the area, and one has already purchased the necessary land.

TRAMWAY AND RAILWAY NOTES.

Australia.—The first report of the Melbourne Tramways Board for the year ended June 30th, 1917, states that the traffic receipts totalled £841,784, and a net surplus of £381,167 resulted. Of this £25,000 has been transferred to the renewal reserve fund, and £100,000 to a reconstruction reserve account for extensive renewals of tracks, reconstruction of power houses, &c., which may be required in the near future. After debiting all charges and appropriations, the surplus for the year is £240,019. The credit at the tramway fund, from which the compensation ultimately awarded to the company will be paid, amounts to £384,597.

The Melbourne City Council has decided to oppose the Victorian Government Tramways Bill in its present form and has recommended the Metropolitan Tramways Conference to oppose its passage into law until amendments are made in the method of election of members and the allocation of districts, &c., as provided in the Tramways Bill promoted by the Metropolitan Municipalities and introduced to Parliament in 1913.

Melbourne Suburban Railway Electrification.—It was stated recently by Mr. E. B. Jones, the Victorian Railway Commissioner, that the effect of transferring the contract for certain portions of the electrical equipment to America was a reduction in the price, which was not now much in excess of Mr. Mera's actual timate.—*Melbourne Age.*

The report of the Adelaide Municipal Tramways Trust for the six months ended July 31st states that, although there had been a record revenue, expenditure had so increased as to absorb the credit balance of £4,381, and leave a deficit of £2,199. The additional expenditure is accounted for by the increased cost of coal and materials, increase in wages, and the rate of interest.

Birmingham.—It was decided on Tuesday last not to run the tramcars or omnibuses on Christmas Day.

Blackburn.—The Lancashire and Cheshire Tramway Managers' Association has accepted the invitation of the local Tramways Committee to hold its November meeting in the town.

Bradford.—Parcels Delivery.—A deputation from the Hull Tramways Committee visited the city last week, to study the parcels delivery system which has been working in Bradford for some years past under the tramway authority. It is proposed to establish a similar branch of the Hull Tramways Department.

Brazil.—According to the financial Press, the Secretary of Agriculture of the State of Sao Paulo has decided to electrify the railway between Sao Paulo and Boituba. It is stated that this will reduce the cost of transport from this important agricultural area.

Constantinople.—A report through German channels, at Brussels, refers to the Compagnie des Tramways et d'Electricité de Constantinople, which is known under the name of the Constantinople Consortium, which is managed by the Société Financiére des Transports, and in which prominent German banks are also interested. The report states that the company has just declared a dividend on the ordinary shares at the rate of 4½ per cent. for 1914-15 and also for 1915-16, which is to be distributed on a future occasion; but no payment is proposed to be made on the other classes of shares. It is added that difficulties are experienced in obtaining raw materials, and only the tramways are in course of favourable development.

Derby.—The Tramways Committee recommends that application be made to the L.G.B. for a further extension of one year for the execution of the tramway work authorised by the Corporation Act, 1913. The tramway receipts for the five weeks ended October 27th, 1917, were £6,224, an increase of £428 over the corresponding period of last year.

Glasgow.—In connection with the announcement by the B. of T. of the appointment of a Special Committee to consider the needs of tramway undertakings as to materials and labour, the local system has, despite a shortage of plant and other handicaps, kept running at a high degree of efficiency, and it has been found possible to give assistance to less fortunate undertakings in Scotland and England. The fact that the department has organised its own repair system very thoroughly has been found of great value. The policy of the B. of T. Committee is to concentrate available material, and in Glasgow it is reported as probable that some of the residential suburban routes may be deprived of their car service, and, should necessity arise, the rails and other plant may be removed.

Huddersfield.—A statement submitted last week shows that the tramway track is in a very bad state of repair, owing to war conditions, and that nothing can be done in the way of thorough renewal until after the war. As a temporary measure of repair, the Tramways Committee, it is stated, has decided to enter into a contract with the Woods-Gilbert Rail Planer and Milling Co. for the grinding and milling of certain sections of track, which, it is held, will prolong the life of the rails from five to seven years.

Year's Working.—The tramway receipts for the year ending September 30th amounted to £146,215, an increase of £9,603 on the previous year's figures. The number of passengers carried was 27,580,552, an increase of 1,252,070, whilst the car-mileage of 2,568,874 was a decrease of 42,993. The staff now included 143 females.

London.—L.C.C.—With reference to the curtailment of transfer tickets, &c., the chairman of the Highways Committee has made the following statement:—"The experience of the management confirms the Committee's expectation that the alteration in transfer facilities would lead to more effective control over the traffic; and it is satisfactory to note that the alteration is having the effect of improving the carrying capacity of the tramways by acceleration of the services. It was to be anticipated that any change not obviously for the benefit of passengers would lead to criticism, and, perhaps, to complaints. The Committee is glad to find that the volume of well-founded complaint has been infinitesimal."

Ramsbottom.—Traffic Figures.—The half-yearly return of the Council's railless-car system shows a good improvement on last year, although, owing to war conditions, there is still difficulty in maintaining a full service. The population served is 10,000, and has been carried 28 times during the half-year, excluding the return journeys of workmen, and over 10,000 wounded soldiers. The miles run were 38,598, against 37,325 for the corresponding period of last year; 31,710 workmen were carried, and 249,970 ordinary passengers, making a total increase on 1916 of 36,500. The receipts were £1,676, as against £1,465, and the average receipts per car-mile were 10·425d., against 9·418d. last year.

Newcastle-on-Tyne.—Annual Report.—Mr. E. Hatton, engineer and general manager of the Corporation tramways, in his annual report says the increase in income (£31,840) is again a notable feature, and is due to the unprecedented conditions prevailing in this area. At the same time, the abnormal conditions have likewise entailed heavy working expenses. The great utility of the car service is clearly shown when it is stated that 78,189,246 passengers were carried in 1916-17, an increase of 5,437,615 over 1915-16, and 13,103,794 over 1914-15. On traffic expenses alone working costs had increased approximately £9,500, and, coupled with an increase of £14,500 on the previous year, made a total increase in the department alone of £24,000 over 1914-15. The aggregate total increase in wages to employés in all departments during the year was £12,910. The only section of the expenditure showing a reduction was general expenses, where the amount payable for local rates, following extended negotiations and litigation with the Poor Law Authorities, had been reduced by approximately £8,000. The increasing demands for a better service of cars for workmen had added to the difficulties of working the undertaking. As showing the extent of the catering for workpeople, more than 380 car loads (averaging 100 passengers per car) are dealt with daily. Mr. Hatton concludes that as they are only able to maintain about 180 cars in service, it is evident that little more can be done in regard to increasing the workmen's service.

On November 5th an electric train from Tynemouth was derailed outside the Central Station; no passengers were hurt, but the line was blocked for some hours.

Reading.—Year's Working.—The annual report of Mr. Craven, general manager and engineer of the Corporation tramways, for the year ended March 31st, 1917, shows a total revenue of £44,597, and working expenses amounting to £23,817, which, with war service allowances and war bonuses of £2,132, totalled £25,949, leaving a gross profit which, with bank interest, amounted to £18,647. Interest, sinking fund, and other charges absorbed £19,294, leaving a net surplus of £5,723, as compared with £6,232 in 1916, of which £4,000 has been transferred to the rate relief account and £1,723 to the renewal reserve fund. The total capital expenditure to date is £230,789, the total amount of the sinking fund is £80,183, and reserve fund £24,122. During the year, 10,919,533 passengers were carried and 912,258 miles run, as compared with 9,953,906 passengers and 924,656 miles in the previous year; 140,767 parcels were carried on the tramways during the period under review, producing a revenue of £812 and a net profit of £137.

Shelf.—The U.D.C. has received notice from the Halifax Corporation that it intends to make application to the B. of T. for an Order extending the period for completion of tramway works in Shelf until August 18th, 1919.

U.S.A.—On July 26th last, the last horse car on the New York tramways was withdrawn, the route, which had been operated at a loss, being abandoned.

The Philadelphia City Transit Department has awarded seven contracts for the construction of the city's high-speed subway and elevated railway, involving an expenditure of 15½ million dollars.

Walsall.—The Electricity Committee has reported to the T.C. that it has forwarded a protest to the Coal Controller against the increased price of coal being made retrospective to September 17th. It was stated by Alderman Cope that if these extra expenses continued the Tramways Committee would have to ask for an increase of fares. The Birmingham and Midland Omnibus Co. has declined the Corporation's suggestion that it should cease to run 'buses in the Walsall areas, and join up at Great Barr to the Walsall tramway service.

TELEGRAPH AND TELEPHONE NOTES.

A Wireless Subterfuge.—The story how a young wireless operator fooled the enemy was related in the Prize Court on Tuesday, when the Crown was asked to condemn the s.s. *Edna* on the ground of un-neutral service and enemy ownership. The plucky operator was Mr. G. D. Smith, an Englishman, who has since received a commission in the R.N.A.S. The *Edna* took on board wireless and gun-sight apparatus, and tried to communicate to the German cruiser *Leipzig* the sailing of British ships—an attempt which was frustrated by Smith.

Before leaving San Francisco, he had heard that the coal taken on board was intended for the *Leipzig*. A German wireless operator was taken on board, and Smith was told that if he refused to do his duty the German would take his place. The German operator, however, did not understand the Marconi system, and Smith shortened the length of the waves, and, though he appeared to be sending out calls for the *Leipzig*, no ship could pick up the message.

The German operator spent three nights and three days trying to call up the *Leipzig*. Smith returned later, and then occasionally called up the German cruiser, putting the wireless right in order to delay suspicions; but the wireless was always out of gear when the German operator tried to use it. At La Paz Smith forwarded a message to the Admiral on the U.S.A. cruiser *California*.

Some of the officers threatened to shoot Smith and throw him overboard if he did not send a code message to the German cruiser, and he then pretended to send it.

The only thing that Smith sent to the *Leipzig* was an inquiry as to where she was, which brought forth a reply that she was hanging around waiting for the *Edna*. Finally the latter was commandeered by the Mexican Government, who put an officer on board, and Smith said that "after that things were more comfortable."—*Daily Chronicle.*

Alien Enemies and the Telephone.—Sir George Cave, replying to a question by Mr. Joynson-Hicks as to the use of a telephone by Hugo Wiskemann, of the Wool Exchange, the son of a German lawyer, said:—Under Article 22-A of the Aliens Restriction Order an alien enemy may not have a telephone without the special permission of the police, which is very rarely given. I am informed that permission to have a telephone was given by the police to this man, who has been 37 years in England, is married to an English wife, and is carrying on under supervision a business which is considered to be useful to this country. I propose, however, to reconsider the whole question of granting these permits to alien enemies.—*The Times.*

Norway.—It is reported that the construction near Stavanger of a wireless telegraph station, which will probably be the most powerful in the world, has been nearly completed. A representative of the Marconi Co. will superintend the testing of the station, which it is expected will take place before the New Year.—*Morning Post.*

Restricted-Hour Telephony.—Leeds Chamber of Trade is advocating the general suspension of the telephone service for an hour at mid-day, in these days of short-handed staffs. It has been reported by Leeds shopkeepers that it is becoming increasingly difficult to get answers to calls at mid-day, partly owing to places being closed during the staff dinner hour. Some Leeds firms have already notified their business connections of a closed hour for the telephone.

CONTRACTS OPEN AND CLOSED.

OPEN.

Aberdeen.—November 19th. G.N. of Scotland Railway. Telegraph material for six or twelve months. Stores Superintendent, 80, Guild Street.

Australia.—Perth.—December 5th and 12th. Postmaster General's Department. Telegraph and telephone instruments and parts, battery material and telephone switchboards, parts, &c. See "Official Notices" to-day.

Newcastle, N.S.W.—December 5th. City Electricity Department. Single or three-phase transformers. Particulars from Electrical Engineer, Council Chambers.

Melbourne.—December 4th. (Extended from November 7th.) P.M.G.'s Department. Telephone and switchboard cable for all States.

Adelaide.—December 12th. P.M.G.'s Department. Telephone material, cells, telephone parts, &c.

Sydney, N.S.W.—December 6th. P.M.G.'s Department. Silk covered and enamelled insulated wire.

Bradford.—November 24th. General stores for tramway department for one year. Particulars from Tramway Offices, 7, Hall Ings.

Carlisle.—December 4th. Electricity Department. One 1500/2000 kw. turbo-alternator and one surface condensing plant. See "Official Notices" to-day.

Dublin.—November 22nd. Electricity Supply Committee. Twenty-four D.C. magazine flame arc lamps. See "Official Notices" to-day.

Enniskillen.—December 1st. Sligo, Leitrim & Northern Counties Railway Co. Telegraph material for 12 months. Mr. J. Duff, Secretary, Enniskillen.

Manchester.—December 12th. Three fan draught cooling towers at the Stuart Street station, for the Electricity Committee. See "Official Notices" to-day.

Newcastle-on-Tyne.—November 22nd. Tyne Improvement Commissioners. Six and twelve months' supply of incandescent lamps and arc lamp carbons. Mr. J. McDonald Manson, General Manager and Secretary, Bewick Street.

Warrington.—November 17th-22nd. Cheshire Lines Committee. Telegraph materials and carbons for twelve months. Stores Superintendent.

CLOSED.

Australia.—Commonwealth Department of Works and Railways. One 5-ton electric overhead travelling crane for the naval establishment, £1,911.—Babcock & Wilcox.

Victorian Railway Department.—300-watt, 220-volt gas-filled incandescent electric lamps, at 15s. 6d. each. 200-watt, 220-volt do., 13s. each.—Australian General Electric Co.

Sydney.—As the British General Electric Co., Ltd., intimated to the City Electrical Engineer that a serious mistake had occurred in their tender for booster plant for the Castlereagh Street sub-station, and that they did not wish to proceed with it, negotiations have been opened with the next lowest tenderer (Messrs. Wm. Adams & Co., Ltd.), who quoted £6,182 for two battery boosters and one milking motor-generator.

FORTHCOMING EVENTS.

Junior Institution of Engineers.—Friday, November 16th. At 8 p.m. At 39, Victoria Street, S.W. Paper on "Apprenticeship of Engineers," by Mr. Towse.

Institution of Mechanical Engineers.—Friday, November 16th. At 6 p.m. At the Institution of Civil Engineers, Great George Street, S.W. Paper on "Some Notes on Air Lift Pumping," by Mr. A. W. Purchas.

Electro-Harmonic Society.—Friday, November 16th. At 6.15 p.m. At the Holborn Restaurant (Venetian Chamber). Concert (ladies' night).

Birmingham and District Electric Club.—Saturday, November 17th. At 7 p.m. At the Swan Hotel, New Street. Paper on "Publicity," by Mr. H. Poulds.

Institution of Post Office Electrical Engineers (London Centre).—Monday, November 19th. At 4 p.m. At the Royal Society of Arts. Paper on "The Electrical Physics of the Atmosphere," by Mr. J. E. Taylor.

Royal Society of Arts.—Wednesday, November 21st. At 4.30 p.m. At John Street, Adelphi, W.C. Inaugural address on "Science and its Functions," by the Chairman of the Council, Mr. A. Campbell Swinton, F.R.S.

Institution of Electrical Engineers.—Thursday, November 22nd. At 6 p.m. At the Institution of Civil Engineers, Great George Street, Westminster, S.W. Paper on "Gas Firing Boilers," by Mr. T. M. Hunter.

Student's Section.—Friday, November 23rd. At 7 p.m. At the City and Guilds (Engin.) College, Exhibition Road, Kensington, S.W. Opening meeting. Address by Sir Oliver Lodge, F.R.S., on "Astronomical Applications of the Electrical Theory of Matter."

NOTES.

Electrical Trades Union.—We have received copies of handbills calling an open meeting of station men for Monday next, at 7.30 p.m., at the Holborn Hall, Gray's Inn Road, E.C. 1. It is being held under the auspices of the London District Committee. The handbill says: "London Station Engineers; membership over 1,000."

Electricity in Farming.—In a recent New Zealand paper, Mr. R. M. Matheson, of the Rangotea Dairy Co., referred to the use of electricity on farms in the Taitapu district, where electricity is largely used for lighting the farm buildings, yards, &c., and for milking operations. Energy is distributed locally from the Taitapu dairy factory, no meters being used on the farms, which are charged flat rates—*i.e.*, £9 per annum for lighting the yard and driving the milking machine and separator, while for a herd of 60 or more cows the charge is £18 per annum, this being the maximum. For home lighting and other domestic uses a charge of 5s. per month is made. The scheme is considered a great success by the farmers, equally as regards economy, efficiency, and cleanliness.

Electrical Incubation.—The Sydney *Daily Telegraph* recently referred to experiments carried out some years ago at Hawkesbury College with electric incubators, which showed their superiority to the lamp incubator. The most important feature was that the electric chicks developed better, and at a month old were 25 per cent. heavier than those from the lamp incubator.

The incubator then used had a faulty temperature control, though at the present day several suitable automatic regulators are available. The *Hobart Mercury* mentions an installation for hatching and rearing chickens at New Town, with 250 and 400-egg incubators, fitted with temperature regulators, which have been designed locally.

Iron-wire Transmission.—A recent issue of our American namesake described a small rural farming electric supply company, composed of 25 farmers, who provided the money and built their own transmission line. The supply, at 6,600 volts, 60 cycles, obtained from the Wisconsin River Power Co., is carried by a No. 4 galvanised iron wire main line, with laterals of No. 6 galvanised iron wire; at a typical farm, two 5-KW. single-phase transformers are installed in open delta, three-phase 250-volt current for power being taken off the two secondaries, while single-phase 110-volt current for lighting is taken from one-half of the secondary of one transformer.

Mr. R. E. Protheroe, presiding at an address by Prof. Wood on "Food Stuffs, &c.," at the Regent Street Polytechnic, said he looked forward to the great benefit that science could confer on agriculture. Farmers now recognised the value of science, and no longer turned the cold shoulder to scientific experiments.

An Indian Bank for Industry.—The Bombay correspondent of the *Times* states that the Tata Industrial Bank is being formed with an authorised capital of £4,000,000, which will have as one of its special functions the assisting of industrial development. "The bank will have an expert intelligence section, scientific and commercial, to report on schemes brought to its notice."

Institution and Lecture Notes. — Institution of Electrical Engineers.—At the meeting held on Thursday, last week, Mr. W. M. Mordey announced the death of Mr. W. du B. Duddell (past-president), and briefly recounted the valuable services which he had rendered to the Institution and the electrical industry before proposing a resolution of condolence with Mr. Duddell's relatives, which was passed by the members standing in silence. Mr. C. P. Sparks (the retiring president), then presented the premiums awarded to the authors of papers during the past session, and installed the new president (Mr. C. H. Wordingham) in the chair. An abstract of the inaugural address is commenced elsewhere in this issue.

The opening meeting of the SCOTTISH LOCAL SECTION was held in Glasgow on Tuesday last, when Mr. A. Page (the new chairman) gave his presidential address. Dealing with the electricity supplies of Scotland, Mr. Page referred to the appointment of the B. of T. Committee on electricity supply. He said that, in accordance with the plan of that Committee, the smaller and older power stations, with their comparatively inefficient plant, would be gradually shut down, and that power would be generated in big central power stations. The proposed developments, he explained, had for their purpose the conserving of the coal wealth of the country and the cheapening of the cost of power to manufacturers, so as to assist them to compete successfully in the markets of the world. He showed how economies could be brought about mainly through the improved efficiency generally in the process of transformation of the energy in coal into electricity, the use of waste heat and water power, improved load and power factors, growth of standardisation, and more equitable taxation on electrical undertakings. He also commented at some length on the various sources from which were likely to come outlets for electrical energy—namely, the electrification of railways, the application of electricity to metallurgical and chemical processes, and also to agriculture. Mr. David A. Starr (the retiring chairman) occupied the chair at the outset, and introduced Mr. Page.

The first meeting of the session of the WESTERN LOCAL SECTION was held at the South Wales Engineers' Institute, Cardiff, on Monday last. Mr. R. Howard Fletcher was inducted to the chair by Mr. W. A. Chamen, who, in alluding to the absence of Prof. D. Robertson (the retiring chairman), referred in eulogistic terms to the interest Prof. Robertson always evinced in anything appertaining to the Western Local Section. Physical inability alone prevented him from coming to Cardiff. Mr. R. H. Fletcher then read his inaugural address, which was followed by a brief discussion. Mr. W. A. Chamen stated that a great deal of the present unsatisfactory relationship between employers and employés could be alleviated, if not actually removed, by the men thoroughly appreciating that the employers were not making the supposed abnormal profits at the expense of the employés' labours. He gave a case in point where dissatisfaction was immediately removed when the men were informed of the true state of affairs. Mr. Teasdel remarked that legislation ought to be brought to bear to enforce the obligations of the men, as well as the employers, in any dispute that might arise; until this came about he could not see how conditions could very much improve.

Royal Society of Arts.—The following are the arrangements for meetings during November and December:—

Wednesday, November 21st, 4.30 p.m., inaugural address of the 164th session of the Society, on "Science and its Functions," by A. Campbell Swinton, F.R.S., Chairman of the Council.
Wednesday, November 28th, 4.30 p.m. (ordinary meeting), G. Holt Thomas, chairman Aircraft Manufacturing Co., "Aerial Transport After the War."
Monday, December 3rd, 4.30 p.m. (Cantor Lecture), Prof. H. C. H. Carpenter, M.A., Ph.D., M.Inst.M.M., "Progress in the Metallurgy of Copper" (Lecture I).
Wednesday, December 5th, 4.30 p.m. (ordinary meeting), Sir Dugald Clerk, K.B.E., D.Sc., F.R.S., Inaugural Trueman Wood Lecture.
Monday, December 10th, 4.30 p.m. (Cantor Lecture), Prof. H. C. H. Carpenter, "Progress in the Metallurgy of Copper" (Lecture II).
Wednesday, December 12th, 4.30 p.m. (ordinary meeting), Lord Charnwood, "Technical Training for Disabled Soldiers and Sailors."
Thursday, December 13th, 4.30 p.m. (Indian Section), D. T. Chadwick, I.C.S., "The Trade of India with Russia, France, and Italy."
Monday, December 17th, 4.30 p.m. (Cantor Lecture), Prof. H. C. H. Carpenter, "Progress in the Metallurgy of Copper" (Lecture III).
Wednesday, December 19th, 4.30 p.m., Prof. J. Wemyss Anderson, M.Inst.C.E., M.I.Mech.E., "The Cold Storage Industry."

The following papers are among those to be read after Christmas:—

Lord Leverhulme, "The Relations Between Labour and Capital—Reasonable Hours, Co-partnership, and Efficiency."
W. L. Hichens, Chairman of Messrs. Cammell Laird & Co., "Labour Economy and Works Organisation."
Sir W. H. Clark, K.C.S.I., C.M.G., Comptroller-General of the Commercial Intelligence Department of the Board of Trade, "The Work of the Board of Trade Department of Commercial Intelligence."
Sir R. Armstrong-Jones, M.D., F.R.C.P., F.R.C.S., "The War and its Effects on the Mind."
A. Newlands, M.Inst.C.E., Chief Engineer Highland Railway, "Water Power in the British Isles."
F. S. Courtney, M.Inst.C.E., Consulting Engineer to the Royal Agricultural Society of England, "Agricultural Machinery."
M. O. Forster, D.Sc., Ph.D., F.R.S., "Organic Chemistry in Relation to Industry."
A. Dickinson, M.Inst.C.E., "Water Power in India."
H. M. Surtees Tuckwell, M.I.Mech.E., "The Tata Iron and Steel Works" (India).
C. du P. Chiappini, Trades Commissioner for the Union of South Africa, "The Industrial Resources of South Africa."

A series of papers has also been arranged dealing with the application of scientific research to the development of particular British industries.

The Cantor Lectures include a series of three by Mr. R. Darling on "High-Temperature Processes and Products" (January 21st, 28th, February 4th); and three by Mr. Edgar Crammond on "The Economic Condition of the United Kingdom Before the War," "The Real Cost of the War," and "Economic Reconstruction" (February 18th, 25th, March 4th).

Decimal Coinage.—At a joint meeting of the Institute of Bankers, the Association of Chambers of Commerce, and the Decimal Association, unanimous agreement was assured as to the retention of the £ sterling as the monetary unit, and its division into 1,000 parts or mils. This enables all the existing gold and silver coins down to, and including, the 6d. piece, to be retained without any alteration in their respective values. With regard to the coins of lower denomination, it was unanimously agreed that they should consist of 1, 2, 3, 4, 5 and 10-mil pieces, of which the last two would be of nickel.

This enlarged range of the coins of lower value, in addition to providing coins substantially equal in value to the existing halfpenny and penny, will provide coins of intermediate value between the present halfpenny and penny, and thus overcome a defect in our present coinage, which has resulted in prices in millions of small transactions in daily life being unduly increased because of the absence of suitable intermediate coins.

New Parliamentary Bills.—Sir A. Stanley, President of the Board of Trade, is introducing three new Bills :—(1) A Bill to continue, with modifications, for a limited period after the termination of the war, certain powers in relation to imports and exports ; (2) A Bill to restrict temporarily the persons who may engage in business connected with certain non-ferrous metals and metallic ores (Sir Arthur told the House of Commons that the Bill would have the effect of preventing German companies from obtaining control of metals in the United Kingdom after the war. The Dominions would deal with the matter as it affected them) ; (3) A new Trade Marks Bill.

With regard to (2) the *Morning Post* states that the Bill applies to zinc, copper, tin, lead, nickel, and aluminium, and is to remain in operation for five years after the war. Licences issued by the Board of Trade will be required before any person can extract, smelt, dress, refine, or deal in any way wholesale or retail with these metals or ores. Licences may be suspended or revoked, and large powers are given to the Board of Trade to call for information and to inspect documents.

Appointments Vacant.—Engineer and manager, for the Borough of Leigh electricity department ; secretary (£800), for the City of Birmingham electricity supply department ; instructor in electrical work (lighting and power) for the Salford War Pensions Committee ; two engineers-in-charge for Worcester electricity works (55s. and a bonus of 10s.). See our advertising pages to-day.

The Alliance of Employers and Employed.—It is announced in the Press that, in view of the success of the National Alliance of Employers and Employed since its foundation in London in December last, it is proposed to hold a meeting of leading employers and representatives of Trade Unions shortly, in connection with the Alliance, to adopt a constitution and a programme which will establish the organisation on a permanent basis and set forth its views and intentions, as a body jointly representative of Capital and Labour, in regard to the crucial industrial issues of the day. The offices of the Alliance are at 64, Victoria Street. Mr. A. H. Paterson is the secretary.

Commercial Treaties.—In the House of Commons, on Monday, the President of the Board of Trade said that the position of this country in regard to its commercial treaty engagements with foreign countries was being carefully examined by the Government with special reference to their bearing on inter-Imperial trade relations and the conservation of Empire resources after the war. The examination was still proceeding.

Allied Control of Metals.—The *Times* states that the scheme for securing the future of the mineral and metal industries of the Allied countries is gradually taking more definite shape. A French company has just been formed, entitled the Société Minerais et Métaux, with a capital of 10 million francs (£400,000), for the purpose of fostering and protecting the metal industries of France. The company, which is thoroughly representative of existing interests, will seek to improve and extend the methods of distribution, treatment, and marketing of the metals produced in France and her colonies, and will also provide financial facilities for their development. It will not be a profit-making enterprise so much as an organisation for securing the economic development and control of the country's mineral and metal industries.

Industrial Reconstruction.—In our issue of October 12th, p. 353, we gave a somewhat full abstract of the scheme of Industrial Reconstruction, for the study of which a Council is to be established. A preliminary meeting, attended by a number of the signatories to the manifesto, was held on Thursday last week at the Savoy Hotel. Sir Wilfrid Stokes, President of the British Engineers' Association, presided, and Mr. E. J. P. Benn gave an account of the progress that had been made, and his ideas respecting the place the Council should fill. It was decided to appoint a provisional committee of five to consider the establishment and constitution of the Council. The committee consists of Sir W. Stokes, Mr. Benn, Mr. T. B. Johnston, and Mr. J. Johnstone, and one other, and it will report to a subsequent meeting.

Problems of Reconstruction.—Speaking at the National Liberal Club last week, Dr. Addison, Minister of Reconstruction, said that no sensible man would say in what precise aspect the problems arising after the war would present themselves, but there were certain conditions which they knew certainly would exist. There would probably be a new world after the war with, perhaps, a better conception of public duty, with different conditions and new problems. It was their intention to minimise control as soon as was possible in accordance with national interests. In view of shortages of some essential commodities it would not be possible wholly to free ourselves from all those things at once. They were endeavouring to bring into their counsel experts in trade, commerce, labour, &c. The progress of this country after the war depended on the increased productivity of the nation as a whole. Unless we could produce more we should be bankrupt. The war had manifested a gigantic capacity, and he wanted to see some of that great enthusiasm projected into reconstruction. After the war the problem of material supplies would immediately become urgent. He had a strong body of experienced men working on the problem, and they were doing all they could to secure the raw materials which would be necessary. The needs of our Allies also had to be considered. Referring to demobilisation, Dr. Addison said that a number of experienced men in the engineering trades were going into the question as to what new industries could be developed. He hoped to announce the names of the committee shortly, and it was intended that this inquiry should be the first of a series. They would also inquire in view of the coming dislocation of labour what class of labour should be employed.—*Morning Post.*

U. D. Councils' Association and Electricity Supply.—We referred in our issue of August 3rd to the resolution of the Executive Council appointing a sub-committee to consider evidence to be furnished on behalf of the Association. The sub-committee held two meetings, and requested Mr. Nicholas to give evidence on certain lines. Prior to the reference by the Executive Council it had been suggested that an engineer witness should also be appointed, and Mr. A. H. Dykes, of Messrs. Handcock, Dykes & Trotter, consulting engineers, was invited, and subsequently gave evidence before the Electric Power Supply Committee. The U.D.C. Association Sub-Committee has expressed its indebtedness both to Mr. Nicholas and Mr. Dykes for the care and attention they have given to this matter.

Electrically-Controlled Motor Boats.—The Admiralty has issued the following statement :—

"The electrically-controlled motor-boats used on the Belgian coast are twin petrol engined vessels partially closed in, and travel at a high speed. They carry a drum with between 30 and 50 miles of insulated single-core cable, through which the boat is controlled electrically. The forepart carries a considerable charge of high explosive, probably from 300 lb. to 500 lb. in weight. The method of operating is to start the engine, after which the crew leave the boat.

"A seaplane, protected by a strong fighting patrol, then accompanies the vessel at a distance of three to five miles, and signals to the shore operator the helm to give the vessel. These signals need only be 'starboard,' 'port,' or 'steady.' The boat is zigzagged while running; this may be either intentional or unintentional. On being steered into a ship the charge is exploded automatically.

"The device is a very old one. A boat similarly controlled was used in H.M.S. *Vernon* (the torpedo experimental ship) as far back as 1885. The only new features in the German boats are petrol engines and W/T. signals, neither of which existed then."

Scottish Local Authorities and B. of T. Electricity Committee.—A conference of representatives of Scottish Local Authorities has been held in connection with the remit to the B.O.T. Special Committee on Electric Power Supply. Representatives were present from Glasgow, Paisley, Greenock, Kilmarnock, Ayr, Wishaw, Motherwell, Falkirk, and Stirling. After an interchange of views the conference resolved as follows :—

(1) That the conclusions of the B.O.T. Committee, so far as relating to the division of the country into areas and the establishment of large generating stations, be approved generally; (2) that, where a local authority is generating or is able and willing to generate electricity on a comprehensive system such as is recommended, the local authority should have the right to do so in preference to a joint board or a company, and be constituted the generating authority for the area in which their district is situated; (3) that the distribution be left in the hands of local authorities or existing companies; (4) that the objects outlined in the remit made to the B.O.T. Committee and in the conclusions already arrived at would appear to be attainable in large measure by the establishment of a central generating authority coupled with a scheme of linking-up, and that the trunk mains necessary in connection therewith should be put down wholly or partially at the expense of the Government; (5) that underground and overhead cables and other underground and overhead works of electricity undertakings be rated on one-fourth of the annual value thereof; (6) that the proposal to establish a Board of Electricity Commissioners is unnecessary, and that a separate department of the B.O.T., with additional powers if necessary, be constituted for dealing with electricity matters, subject to the retention of an appeal to Parliament in cases where such now exists. If such a board is constituted, it should be subject to the control of Parliament, and all existing rights of appeal should be conserved; and (7) that the existing rights of local authorities as regards overhead wires, non-interference with streets, and powers of purchase be retained, with an appeal where consent is unreasonably withheld.

Coun. J. W. Stewart and Mr. W. W. Lackie were appointed to represent the views of the conference to the B.O.T., and a committee, consisting of one representative from each of the towns invited to the conference, was appointed to go over the evidence to be submitted, and to watch further proceedings in the interests of local authorities.

At a subsequent meeting of the Glasgow Electricity Committee it was agreed to recommend the Corporation to authorise the witnesses to state that if it is ultimately determined to divide the country into areas for the purpose of generating electricity, and an area is created for Glasgow and the Clyde and places adjacent, the Corporation is prepared to become the generating authority for such area, provided the terms and conditions upon which they are required to do so will not be detrimental to the city and its existing electrical undertaking.

Inquiry.—The makers of "Uncolite" are asked for.

Volunteer Notes.—COUNTY OF LONDON VOLUNTEER ENGINEERS (FIELD COMPANIES).—Headquarters, Balderton Street, Oxford Street, W. 1.

Orders for the week, by Lieut.-Colonel C.B. Clay, V.D., commanding:—
Officer for the Week.—Lieut. C. E. Campbell.
Next for Duty.—Lieut. W. J. A. Watkins.
Drills.—Week ending Sunday, November 25th, 1917:—
Monday.—No. 3 Company, Left Half. Recruits, signalling, 6.30.
Tuesday.—Physical drill and bayonet exercise, 7.30.
Wednesday.—No. 1 Company, 6.30.
Thursday.—No. 2 Company, 6; signalling, ambulance, 6.30.
Friday.—No. 3 Company, Right Half. Recruits, 6.30.
Sunday.—Commandant's Parade for heavy bridging instruction at Esher. Parade Waterloo Station, opposite No. 10 Platform, 8.35 a.m. Uniform, haversack, and water bottle. Mid-day rations to be carried. Compulsory for men in Sections A, B, and C.
Musketry.—Belvedere Road, Tuesday, Wednesday, and Thursday, 5.30 to 7.
(By order) MACLEOD YEARSLEY, *Capt. and Adjutant.*

The Whitley Report.—In the course of the debate in the House of Lords on the Marquess of Salisbury's motion respecting "Industrial Unrest," Viscount Milner, in replying, referred to the Whitley Report. He said that the establishment of Industrial Councils was by universal consent the most important point in the debate. The Whitley report reached the Government as a confidential document in March. It met with universal approval, and very high hopes were raised as to the beneficent effects that might result from the adoption of the system recommended. Its reception was encouraging beyond the highest hopes of those warmly in favour of it. Seven of the Industrial Unrest Sub-Commissions emphatically favoured it. The Trade Unions by a great majority favoured its principles; several made criticisms and reservations; hardly any were absolutely adverse. Taken as a whole, the views of the Trade Unions and of the Employers' Associations were overwhelmingly in favour of the recommendations. The Government had no longer any doubt as to what was the proper course to pursue, and they had given instructions to the Ministry of Labour to take immediate action to carry out the scheme. A new department of the Ministry of Labour was now at work trying to get Industrial Councils established as quickly as possible in the various leading industries. Certain trades were to be started with, as these, before the report was published, were making preparations for the constitution of such Councils. From these the Ministry would proceed to more difficult spheres of action, and so cover as large a portion of the field as could be covered at once, as quickly as possible. Viscount Milner said that although he was not absolutely optimistic, he thought that he could say that the new departure was the most hopeful that he could remember in the great field of social reform. The situation was full of anxiety, and the work which had been done was as nothing compared with the mountains that had to be climbed, both in the war and in peace.

Control of Tramway Labour and Material.—The Board of Trade has issued the following announcement in regard to the regulations of the supply of material, &c., for tramways:—

"In view of the difficulty in meeting the demands for various materials and labour required for the maintenance and renewal of the permanent way and rolling stock of the tramway undertakings, the Board of Trade are appointing a Committee to consider the needs of these undertakings, so that the necessary steps may be taken to supply, as far as possible, such needs, even though it may be at some temporary sacrifice to less essential undertakings.

"The Municipal Tramways Association and the Tramways and Light Railways Association are being invited to nominate members to the Committee, and the Board have asked the London County Council to allow Mr. A. L. C. Fell, the manager of their tramways, to serve on it.

"Mr. James Devonshire has been invited to be chairman of the Committee. It is not intended that the control of tramway undertakings should be interfered with by the Committee."

In the House of Commons, Sir A. Stanley said that the object of the Committee was not to take control of tramway undertakings, but to meet the needs of these undertakings engaged in work essential to the prosecution of the war.

Co-operation between Gas and Electricity.—From the Report of the National Gas Council on Coal Supplies, &c., which was recently submitted, it appears that six meetings of the "Utilisation of the Fuel Resources Committee" have been held, and a report, which it is proposed to submit to the Government, is now in preparation. It is anticipated that suggestions on the following lines will be made:—(1) In the interests of national economy, the desirability of all coal of a bituminous character hitherto used directly as fuel being first treated for the extraction of its by-products. (2) Where gas undertakings are in proximity to electric power stations, an endeavour should be made to enter into an arrangement with electric undertakings for the supply of fuel for steam-raising in the form of coke or breeze. A Sub-Committee is now investigating the question of tar-burning for steam-raising.—*Iron and C. T. Review.*

The Six-Hour Day.—Lord Leverhulme continues to advocate the six-hour working day in factories as a means for increasing production and providing work for all the men who return from the war. Machinery would increase production and enable higher wages to be paid. He argues for a better environment, a better outlook, better education, and more leisure, out of which real culture springs. He suggests that with a six-hour day the one shift could work from 7 o'clock until 1.30 and the second could then come on, each having half-an-hour allowed for meal-times. The order of the shifts would be reversed in alternate weeks.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Central Station Officials.—The Poplar B.C. Electricity Committee recommends that in order to bring the war bonus of junior officers in the electricity department into line with the last increase granted to workmen and advances to junior officers in the works department, an additional war bonus of £10 per annum should be granted to these officers. Eleven officers will be affected, viz.: seven at £185, three at £150, and one at £120 per annum.

Derby T.C. has approved of the following increases in salaries:—Messrs. G. J. Scales and H. T. Letchford, charge engineers, from £130 to £160 per annum, and to £170 in January, 1918; Mr. R. Littlewood, clerk, from £112 to £130 per annum; Mr. W. G. Huliston, clerk, from £108 to £125 per annum.

Mr. J. W. LOWE, senior shift engineer, Wigan Corporation electricity department, was presented with a case of cutlery on 7th inst. on his leaving to take up the post of station superintendent to the Leyland Motor Co. at the new steel works, Farington.

Mr. JOHN LAMBERT, Corporation electrical engineer, Perth, has had his salary increased by £25.

At the end of November, Mr. ARTHUR T. SMITH will be severing his connection with the Leigh Corporation electricity works, of which he has been engineer and manager, as he has accepted an appointment on the staff of the British Dyes, Ltd., Huddersfield.

General.—The King has granted the Royal authority to Sir JOHN HUNTER, K.B.E., Director of Factory Construction and Director of Iron and Steel Production; Sir LEONARD WILKINSON LLEWELYN, K.B.E., Controller of Non-Ferrous Materials Supply; and Mr. WILLIAM TURNER MACLELLAN, Officials of the Ministry of Munitions of War, to wear the Cross of Chevalier of the Legion of Honour, conferred upon them by the President of the French Republic in recognition of valuable services.

The following service appointments have been gazetted:—Fortress Electric Lights.—The undermentioned to the Second-Lieutenants on probation: Corporal James Paton, from the Royal Engineers (T.F.); Corporal Arthur Ormans Lyons, from Royal Engineers (T.F.); Sergeant Albert Seddons, from Royal Engineers (T.F.); and Staff-Sergeant J. H. Tulloch, from the Royal Engineers (T.F.). Tyne Electrical Engineers.—John R. Lang-Hyde to be Second-Lieutenant.

Glasgow T.C. has appointed the following conveners and vice-conveners:—Tramways Committee, Mr. M. W. MONTGOMERY and Mr. T. KELLY; Electricity Committee, Mr. W. H. HANNAY and Mr. P. G. STEWART respectively.

Mr. HARRISON BARRON has been elected chairman of the Birmingham Tramways Committee for the eleventh time.

Mr. H. LUPTON and Mr. J. CLARK have been elected chairman and vice-chairman respectively of the Leeds Corporation Electricity Committee.

Aldermen R. A. SMITHSON and H. BROWN have been elected chairman and vice-chairman respectively of the Leeds Corporation Tramways Committee.

Roll of Honour.—Second-Lieutenant R. O. GLADSTONE, R.E., has been killed in action. At the outbreak of the war he was in Spain for the British Thomson-Houston Co., but came home and at once joined up in the ranks.

Sergeant W. J. BENNETT, R.E., killed in action, was a wireless operator with the Marconi Co.

Private N. WHITE, wounded and missing, was employed by the Automatic Telephone Co., Liverpool.

Private W. WEIR, Manchester Regiment, killed in action, was before the war in the employ of Messrs. Baxendale and Co., Ltd., Manchester.

Private H. CROWLEY, Manchester Regiment, of Spring Gardens, Barton, killed in action, was employed at the British Westinghouse Co., Ltd., Trafford Park.

Private D. GREGORY, Border Regiment, killed, was employed by Messrs. W. T. Glover & Co., Ltd., Trafford Park.

Private P. H. BOWERS, Royal Warwickshire Regiment, killed in action, was 20 years of age, and employed by the St. Helens Cable Co., Warrington.

Sapper C. VICKERS, R.E., killed in action, was an electric meter inspector for the Leeds Corporation.

Corporal W. HOLGATE, K.O.Y.L.I., killed in action, was employed by Messrs. Wright & Wood, Halifax.

Private E. KAYLEY, of the Loyal North Lancashire Regiment, who was wounded and taken prisoner during the Battle of the Somme last year, has written home from Germany, enclosing a photograph, and saying he is as cheerful as circumstances will permit. He thanks Messrs. Dick, Kerr and Co., Ltd., Preston, for the parcels sent during the last 12 months, all of which he has received.

Private E. STARKEY, West Yorkshire Regiment, an employé of Messrs Messenger & Sons, Birmingham, electric lamp manufacturers, has gained the Military Medal for carrying messages continuously through heavy shell fire.

Corporal J. E. MOGG, K.O.Y.L.I., has fallen in action. He

was an employé of the Electric & Ordnance Accessories Co., Birmingham.

Gunner J. W. Osborne, R.F.A., of Elland, who is an electrician, has been awarded the Military Medal.

Private J. L. Millings, Australian Infantry Force, who was an electrical engineer, has fallen in action.

Corporal A. C. Pearce, R.E., formerly an overhead lineman on the Corporation tramways at Croydon, who is in hospital, has been awarded the Military Medal.

Lance-Corporal C. Thake, R.W. Kent Regiment, who has been wounded, was on the staff of Mr. E. Powell, electrician, Tunbridge Wells.

Corporal C. H. Tompkins, Oxford and Bucks Light Infantry, who has died of wounds, was in the Rugby works of the B.T.H. Co.

First-Class Air Mechanic P. F. Hooker, who joined the R.F.C. in February, 1915, whilst an electrical engineering pupil with Mr. A. T. Lambert, manager of the Maidstone Corporation tramways, has been awarded the Military Medal for bravery.

Private A. W. Jacobs, City of London Fusiliers, who has fallen in action, was an employé of Messrs. Johnson and Phillips, Ltd., of Charlton, S.E.

Sergeant H. H. J. Heritage, who was with Messrs. Hill, Upton & Co., electrical engineers, of Oxford, when he was mobolised as a Territorial on the outbreak of war, has been given a commission as Second-Lieutenant in the R.E.

Private F. Hilditch, killed in action, was in the electrical department of the Potteries Electric Traction Co.

Driver G. H. Mason, R.F.A., who has fallen in action, was on the staff of the Potteries Electric Traction Co.

Obituary.—Mr. J. Stell.—Mr. John Stell, of Shipley, who died last week in his 68th year, was the chairman of the Yorkshire Cable Co., Ltd., Bradford, from its inception.

Mr. Woodhead.—The death is announced of Mr. Woodhead, rolling stock superintendent to the Walsall municipal tramways undertaking.

Mr. W. du B. Duddell.—The funeral of the late Mr. W. du B. Duddell took place at Brighton on November 8th, in the presence of his relatives; Mr. W. M. Mordey and Mr. Roger Smith, representing the Institution of Electrical Engineers, and Prof. T. Mather, F.R.S., representing the Royal Society and the Physical Society, were also present at the ceremony.

Commandant C. Tissot.—From *La Revue Générale d'Electricité* we learn that Commandant C. Tissot, the distinguished French naval officer, Professor at the Naval School, and a noted exponent of wireless telegraphy, died on October 1st at the early age of 49. Amongst other achievements, he was one of the first to measure the current received in wireless telegraphy, and to deduce the law of range, to study the damping of antennæ and its relation to the quality of the earth-connection, and to advocate and assist in the introduction of wireless time signals, and during the war he was constantly employed upon work of national importance, in the course of which he contracted the illness which led to his untimely death.

NEW COMPANIES REGISTERED.

Rustless Iron (Cowper-Coles Process), Ltd. (148,832).—Registered November 6th. Capital, £5,500 in 3,000 7½ per cent. cum. pref shares of £1 each, and 10,000 ord. shares of 1s. each. To carry on any business connected with the manufacture of rustless iron and other metals, and the development of processes for preventing rust and corrosion, and to carry on the business of mechanical and electrical engineers, metallurgists, chemists, &c. Agreement with Sherard Cowper-Coles. The subscribers (each with one share) are:—W. H. Essex, Haven-o'-Rest, Sunmead Road, Sunbury-on-Thames, company secretary; H. V. Steele, 9, The Avenue, Sunbury-on-Thames, company secretary. First directors: Sherard Cowper-Coles, and others to be appointed by the subscribers.

Taylor & Co. (Hatton Garden), Ltd. (148,833).—Private company. Registered November 6th. Capital, £1,000 in £1 shares. Manufacturers of and dealers in mica, micanite, electrical plant and accessories, insulating machinery, mica chimneys, lamp tops, &c. The subscribers (each with one share) are:—Miss J. Taylor, 40, Hatton Garden, E.C.; E. W. Tester, 25, Victoria Street, S.W., stockbroker. The first directors are to be appointed by the subscribers. Solicitors: Campbell, Hooper & Todd, 30, Golden Square, W.

G. & S., Ltd. (148,816).—Private company. Registered November 5th. Capital, £1,200 in £1 shares. Electrical, general, and mechanical engineers, machinists, founders, smiths, fitters, wood workers, builders, painters, japanners, enamellers, manufacturers of and dealers in motor cycles and cars, &c. Agreement with K. E. L. Guinness and C. M. Smith. The subscribers (each with one share) are:—K. E. L. Guinness, Aranmore, Kingston Hill, Surrey, engineer; C. L. Smith, Glenavon, Bedford, engineer; H. P. Hawthorn, Newlyn, Jarvis Brook, Sussex, engineering works manager; Mrs. B. Fuller, 17, Moscow Court, W. 2. The first directors are to be appointed by the subscribers. Solicitors: Mellor & Co., 8, Coleman Street, E.C.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

Isle of Thanet Electric Tramways & Lighting Co., Ltd.—Agreement dated October 25th, 1917, to issue £3,000 debenture stock for a loan of £1,500. Property charged: That charged by trust deed of January, 1902, securing the company's debenture stock, viz.:—The company's undertaking and property, present and future. Holder: J. B. Glenn, Moorgate Station Chambers, E.C.

CITY NOTES.

Auckland Electric Tramways Co., Ltd. The traffic receipts during the year ended June 30th, 1917, were £282,698, an increase of £7,914. The total revenue was £286,886. After providing for all expenses chargeable to revenue, including £20,802 for debenture and other interest, £5,401 for rental and percentage of profits payable to the Auckland City Council, and setting aside £25,000 to renewals and depreciation account, the surplus is £55,317, plus £4,601 brought forward, making £59,917. After paying the preference dividend (£9,000), putting £10,000 to reserve, and paying a total dividend of 1s. 7d. per share, less income-tax, for the year on the ordinary shares, £5,292 is to be carried forward. During the year £8,486 first mortgage debenture stock was bought and cancelled at an average cost of 93½ per cent. No further capital was issued. The capital expended was £9,546, chiefly for the Upper Queen Street extension, which was opened in October of last year. The route miles open are 27.13, as against 26.59. The passengers carried were 43,351,032, against 42,352,534. Average receipts per passenger 1.57d., against 1.56d. Average expenditure per passenger 1.00d., against 99d.

Drake and Gorham, Ltd. In his speech at the annual meeting held last week, Mr. B. Drake said that the year's profit of £11,395 compared with £8,527 for the preceding year, and constituted a record since 1903. Although, as in most British electrical concerns, their dividends paid in the past had not been such as an investor expected from an industrial enterprise, yet the amounts earned had now exceeded the capital of the company. The assets had been increased by over £35,000, and about £93,000 had been distributed in dividends. By adopting a conservative policy in the matter of distribution they had been able to enter new fields without having to raise additional capital, which would have been difficult to obtain. It was fortunate that the board decided in the past not to rely solely on country-house lighting, with which the name of the company was originally connected, for, in spite of the practical suspension of this class of work, they had been able by manufacturing and wholesale trade, coupled with contracting for the equipment of war factories, camps, aerodromes, &c., to reach a turnover considerably in excess of what was previously found possible. There was little doubt that the supply of electrical power to factories, in which direction the company had acquired considerable experience, would after the war become a more valuable branch of their business. The power station erected by the company for a leading chemical company had for some time been working night and day, and had given satisfaction. Negotiations were in progress for similar work on a larger scale. The Manchester branch had done well in all departments, and again showed increased profits. The electric vehicle business, as might be expected, had increased, and there was no doubt that the results obtained would ensure a continuance of this method of propulsion even when petrol was again available at reasonable prices. As the lease of the present warehouse and works was expiring, and it was evident that the turnover warranted larger premises, they had taken the Rockingham Works, Newington, on lease. It had been difficult to decide on the size of works which they were justified in acquiring, owing to the absence of any declaration on the part of the Government as to their after-war policy. Manifestly, if the pre-war dumping was again to be permitted, and the electrical industry was not to be fostered more than in the past, the manufacture of electrical goods would again show poor returns on capital invested. In view of the uncertainty, they had not felt it wise at present to extend their manufacturing on the scale that they would have wished. They, however, anticipated that in any event the wholesale merchanting branch at home and overseas would expand, and they were negotiating for a warehouse which should meet their needs for many years. They had a good list of orders for the first quarter of the current year, and were constantly receiving repeat orders, but if the war continued it was impossible to foretell what results they might be able to show in the next balance-sheet.

Western Telegraph Co., Ltd.—The company has now issued its report for the year ended June 30th. The revenue was £1,073,296, and the working expenses were £397,891. After providing £32,747 for debenture interest, and £149,226 for income-tax and excess profits duty, the balance is £493,432, plus £38,345 brought forward. There has been transferred in further reduction of the amount of capital expenditure in excess of the share capital and debenture stock issued £150,000, to general reserve £100,000, to land and buildings depreciation fund £30,000, and to maintenance ships reserve fund £50,000. The total distributions for the year have amounted to 8 per cent., free of tax, leaving £35,433 to carry forward.

Stothert & Pitt, Ltd.—Dividend of 10 per cent. and a bonus of 2½ per cent., free of tax, on the ordinary shares. £5,000 is put to reserve, and £12,998 to the extinction of goodwill account.

Quebec Railway, Light, Heat & Power Co., Ltd.—At the annual meeting, held in Montreal on October 11th, it was reported that the gross earning for the year ended June, 1917, were $1,832,032, an increase of $100,299. Miscellaneous income was $230,851, and the increase from all sources was $94,281. Operating and maintenance expenses at $1,155,969 showed an increase of $126,218. The net surplus is $200,587. The properties had been kept in a high state of efficiency, $226,366 having been expended during the year on maintenance accounts. The capital expended during the year was $302,664. Mr. H. G. Matthews, the general manager, died in July, and Mr. W. J. Lynch, treasurer and comptroller, had been appointed to his post. The Hon. R. Mackay, a director since the organisation of the company, died in December.

Nairobi Electric Power & Lighting Co., Ltd.—The accounts for 1916, the publication of which has been delayed by war conditions, shows that the units generated were 1,495,281, as against 1,122,744 for 1915; motors connected, B.H.P. 648, against 431 in 1915; lights connected (40 watts) 9,811, against 8,044 in 1915. The auxiliary steam plant erected at Nairobi was used to the extent of rather more than 10 per cent. of the total units generated. The share capital is £32,950 issued, a slight increase. The preference and ordinary shares have been consolidated into shares of one class only. The war occasions increasing difficulties in carrying on the company's operations. Further developments are nearly stopped on account of the impossibility of procuring the necessary plant and materials at Nairobi. A final dividend of 4 per cent., making the total 10 per cent. for the year, less income-tax, on all shares, is to be paid.

Trafford Park Estates, Ltd.—For the year ended June, 1917, the profit was £35,526, plus £50,352 brought forward. A dividend of 5 per cent. is recommended, carrying forward £54,766.

United Electric Tramways of Caracas, Ltd.—A dividend of 7 per cent., less income-tax, for the year is to be paid, carrying £1,899 forward.

STOCKS AND SHARES.

TUESDAY EVENING.

STOCK EXCHANGE markets are in quiet mood. Russia and Italy are uncomfortable factors. From the merely financial point of view, Russia is, for practical purposes, written off for the time being, but it is hoped that the Italian prospect may any day take a sharp turn for the better. Money goes steadily into the new War Bonds; subscriptions, however, are less than they ought to be, and it would appear as though capital were being accumulated in deposit and other accounts. Still, the applications do make a difference to the volume of investment business which might otherwise be flowing into Stock Exchange markets.

While Home Railway stocks are better as a whole, the Underground list is dull and heavy. Income Bonds further gave way, and the shilling shares went back to 6s. Metropolitan Consolidated rallied after being weak at 22½.

The most active part of the electrical markets is that concerned with the manufacturing shares. Comparatively speaking, there is a lot of business doing in Edison Swan shares, which stand at the good price of 26s. 6d., while the fully-paid hold their rise at 2½. Cromptons, too, are strong at 13s. 6d., with a good demand for them, and the preference are 15s. General Electrics hold their big rise, the ordinary at 18¼, while the preference are 10½, and there would be much more doing in them were there sufficient supply of shares to render the market liquid. British Aluminiums reacted a shade to 32s. The little rise in Aron ordinary brought in a few sellers, and the price has gone back a trifle to 2s. 3d. There still seems to be an expectation, rather than a hope, that some kind of amalgamation or agreement of interests will be arrived at between various manufacturing interests, and to the expectation is added the hint that the United States manufacturers may also come into the business, but we have failed to find any justification beyond rumour only.

The foreign division is dull, with the exception of Brazil Tractions. The latter have recovered a point to 43, and are a better market than they have been lately. British Columbia Deferred at 28 is ½ better, and the 4½ per cent. debenture stock retains its recovery of 4 points. Mexican Light and Common first bonds went back to 42, a drop of 3 points, most Mexican issues being weak. There is no change in the Argentine list. It is worth observing that Indian shares are in some request. Bombay Electric preference moved up to 9¼. Madras preference are wanted about 4½; the last business recorded in the shares was at 4¼ in the middle of July. Calcutta Trams changed hands the other day at 6 13/16; the price of the preference is £4, and the 4½ per cent. debenture stock has lately hardened to 74. There is a little business passing, too, in British Electric Tractions, the ordinary being easier at 31½, the 6 per cent. participating preference stock 74, while the first and second debentures are 74 and 65 respectively. La Plata Tramways ordinary were done the other day at 2s. 4½d., and the preference stand about 6s. 3d. London United Tramways debenture is unchanged at 35½, on the company's publication of its intention to apply for Parliamentary permission to re-arrange its fares. Cape Electric Trams are lower at 11s. 3d.

The telegraph market is quiet. Anglo-American preferred fell a point to 97, but the Eastern group keeps its prices, and Westerns in particular are strong at 15½. Oriental Telephones went back to 3. Marconis have undergone a change for the better, the parent shares hardening to 3½, while the Marines maintain their position as the firmest of the group at 2 21/32. The speculation in American Marconi and in Canadians has died out for the time being. The prices of the two are respectively 21s. 6d. and 10s. 6d.

City of London ordinary shares are ½ better at 13½, this being the only change in the lighting list on the week. Dealers in the market report that there is still a strong demand for the best class shares, of which the scarcity is almost as marked as that of tea, butter, and sugar, while it is almost impossible to obtain debenture stocks. Activity in the manufacturing list makes up a good deal for the quietude of business in the supply shares, and one hears an occasional wish that certain companies would follow the example set in other directions, and split their shares into smaller denominations in order to render the market in them more liquid. Of this, however, there is no indication at present, nor does it seem to be at all likely that such a course would be pursued.

The Rubber share market is quiet, and inclined to go lower in company with the price of the raw article. Provincial buyers show a mild disposition to pick up tin and copper shares, and the armament group is a little better. Taken all round, however, Stock Exchange business is quiet; the War Loan and industrials make the best showing.

SHARE LIST OF ELECTRICAL COMPANIES.

	Dividend 1916.	Dividend 1916.	Price Nov. 13, 1917	Rise or fall this week.	Yield p.c.
HOME ELECTRICITY COMPANIES.					
Brompton Ordinary	10	9	6½	—	£6 18 6
Charing Cross Ordinary ..	5	5	4	—	6 5 0
do. do. do. 4½ Pref..	4½	4½	33	—	6 13 4
Chelsea	4	3	2⅞	—	5 9 1
City of London	8	8	13½	+ ½	6 2 0
do. do. 6 per cent. Pref.	6	6	10½	—	5 18 6
County of London	7	7	11	—	6 7 3
do. 6 per cent. Pref.	6	6	10	—	6 0 0
Kensington Ordinary	7	6	5½	—	5 14 3
London Electric	3	3	1	—	Nil
do. do. 6 per cent. Pref.	6	4	3½	—	5 6 8
Metropolitan	3	3	3½	—	4 12 4
do. 4½ per cent. Pref.	4½	4½	34	—	7 4 0
St. James' and Pall Mall ..	8	8	7	—	5 14 6
South London	5	5	3	—	6 13 4
South Metropolitan Pref. ..	7	7	21/6	—	6 10 6
Westminster Ordinary	7	7	6½	—	5 8 3
TELEGRAPHS AND TELEPHONES.					
Anglo-Am. Tel. Pref.	6	6	97	−7	6 3 9
do. Def.	33/6	1½	26½	—	6 9 0
Chile Telephone	8	8	7⅞	—	*5 11 4
Cuba Sub. Ord.	8	7	8⅞	—	*3 0 0
Eastern Extension	8	8	14⅞	—	*5 7 9
Eastern Tel. Ord.	8	8	149½	—	*5 7 0
Globe Tel. and T. Ord.	7	7	13½	—	*5 5 8
do. Pref.	6	6	10⅝	—	5 15 8
Great Northern Tel.	23	24	88½	− ½	6 4 8
Indo-European	13	13	52½	—	6 3 10
Marconi	10	15	3½	+ 1/16	4 12 4
Oriental Telephone Ord. ..	10	10	3	− ½	3 6 8
United R. Plate Tel.	8	8	6⅝	—	5 18 6
West India and Pan.	6d.	6d.	1/16	—	*3 9 6
Western Telegraph	7	8	15½	—	*5 5 0
HOME RAILS.					
Central London, Ord. Assented	4	4	60½	—	6 12 8
Metropolitan	1	1	23	—	4 7 0
do. District	Nil	Nil	16	—	Nil
Underground Electric Ordinary	Nil	Nil	1½	—	Nil
do. do. "A" ..	Nil	Nil	6/9	−9d.	Nil
do. do. Income	5	4	82	−1	4 17 5
FOREIGN TRAMS, &c.	Dividend 1915.	Dividend 1916.			
Adelaide Sup. 6 per cent. Pref.	6	6	47	—	6 3 1
Anglo-Arg. Trams, First Pref.	5½	5½	3	—	9 3 4
do. 2nd Pref. ..	5½	—	2½	—	—
do. 5 Deb. ..	5	5	68	—	7 7 3
Brazil Tractions	4	4	43	+1	—
Bombay Electric Pref.	6	6	9½	+ ½	6 3 1
British Columbia Elec. Ry. Pfce.	5	5	63½	—	11 18 2
do. do. Preferred	Nil	Nil	9½	—	Nil
do. do. Deferred	Nil	Nil	28	+ ½	Nil
do. do. Deb.	4½	4½	65	—	7 14 7
Mexico Trams 5 per cent. Bonds	Nil	Nil	44½	—	Nil
do. 6 per cent. Bonds	Nil	Nil	60	—	Nil
Mexican Light Common ..	Nil	Nil	52½	—	Nil
do. Pref.	Nil	Nil	95	—	Nil
do. 1st Bonds ..	Nil	Nil	42½	−3	—
MANUFACTURING COMPANIES.					
Babcock & Wilcox	15	15	3⅛xd	—	4 18 0
British Aluminium Ord. ..	7	10	13½	— 3/32	6 5 5
British Insulated Ord.	17½	20	8	—	6 13 4
British Westinghouse Pref. ..	7½	7½	2⅜	+ ½	5 2 0
Callenders	20	20	14⅜	—	6 18 0
do. 5 Pref.	5	5	4½	—	5 1 4
Castner-Kellner	22	22	3⅞	—	6 8 0
Edison Swan, fully paid ..	—	—	26½	—	Nil
do. do. 4 per cent. Deb.	4	4	74½	—	5 7 5
Electric Construction	7½	7½	13	+ ½	6 13 4
Gen. Elec. Pref.	6	6	10½	—	5 14 3
do. Ord.	10	10	12⅜	—	5 8 0
Henley	25	25	19½	—	7 14 8
do. 4½ Pref.	4½	4½	4	—	5 12 6
India-Rubber	10	12	14½	—	*7 1 7
Telegraph Con.	20	20	41	—	*5 17 0

* Dividends paid free of income-tax.

DOMESTIC ELECTRIC HEATING PROBLEMS.

Water Heating.—At the Joint Convention of the North-West Electric Light and Power Association and Washington Contractors' Association, held recently, a whole day was given to the discussion of electric range and water heating problems. Electric water heating is a live problem in America, and, judging by one of the papers quoted in the *Journal of Electricity*, some sort of agreement as to general practice has been achieved. It is pointed out that an automatic circulation gives the best service, consumption averaging 3 to 4 KW.-hour per day per person, which, at 1 cent per KW.-hour, is satisfactory to the average consumer.

The efficiency depends on the installation as a whole, and, for average conditions, is assumed to be 85 per cent.

The needs of the average small family of three or four persons can be satisfactorily met by a 30-gallon boiler and 2-KW. thermally controlled heater of the circulation type, while larger families of six or eight persons would use a 3 or 4-KW. heater of the same type.

Fig. 1 shows the method of installation recommended, and fig. 2 the thermal switch or automatic cut-off. The bottom of the heater should be as low as, or lower than, the bottom of the boiler, to ensure circulation and the operation of the thermal switch. The heater should take cold water from the bottom of the boiler, and

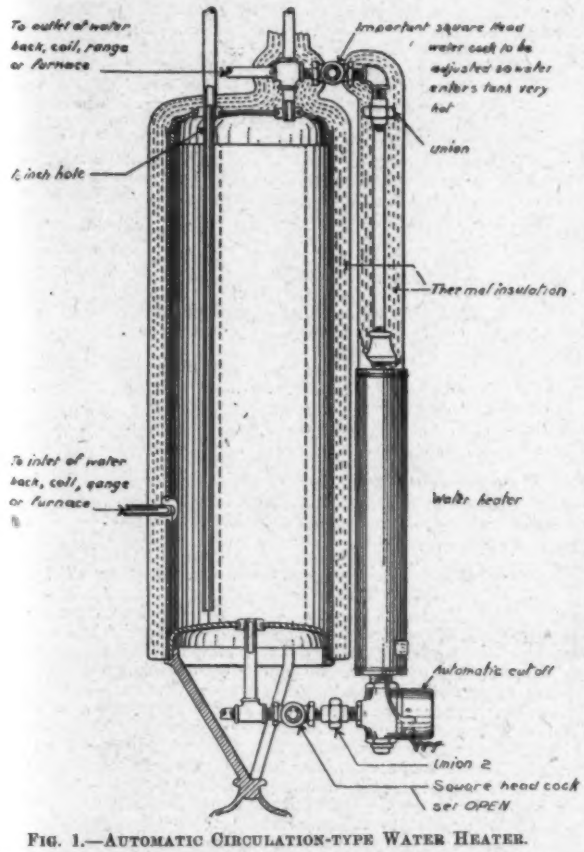

To outlet of water back, coil, range or furnace
Important square head water cock to be adjusted so water enters tank very hot
union
¼ inch hole
Thermal insulation
To inlet of water back, coil, range or furnace
Water heater
Automatic cut-off
Union 2
Square head cock set OPEN

FIG. 1.—AUTOMATIC CIRCULATION-TYPE WATER HEATER.

deliver hot water to the top; cocks are fitted above and below the boiler to enable the heater to be removed without drawing off the water, but the upper cock is also used to restrict water circulation, in order to give a greater heating effect in the circulator. Three makes of heaters are fitted with restricted openings for this purpose, but the use of cocks is advised in any case.

The cocks should be adjusted so that the heater delivers water at 160-175° F.; the lower cock corrects the tendency of cold water in the bottom of the boiler to by-pass through the heater to the top of the boiler when hot water is being withdrawn. The heater and pipes should be insulated with magnesia or similar covering 1 in. thick.

The thermal switch is stated to be simple and reliable, and easily installed in the pipe below any standard circulation heater, the switch being sold for from $7 to $8.

The thermally-controlled immersion heater can be used instead of the circulation type, and being within the boiler, will decrease radiation losses, though it should be used with an ample-capacity boiler, so that there is always a sufficient quantity of hot water left at the top to meet demands while the remainder of the water is being heated up.

This heater has the characteristic of mixing the water and raising the temperature of practically the entire boiler at the same time.

Where the rate is considered too high, or it is unnecessary to maintain a hot water supply at all times, a non-automatic circulation heater of 4 or 5-KW. capacity can be used on a double-throw switch with the range, and a lower energy consumption will result by reason of the lower radiation losses, &c.

Non-automatic immersion heaters of small capacity have been used in considerable numbers in the North-West, but suffer from the same disadvantages as the automatic-immersion type.

The instantaneous type of heater without coils or switch, and

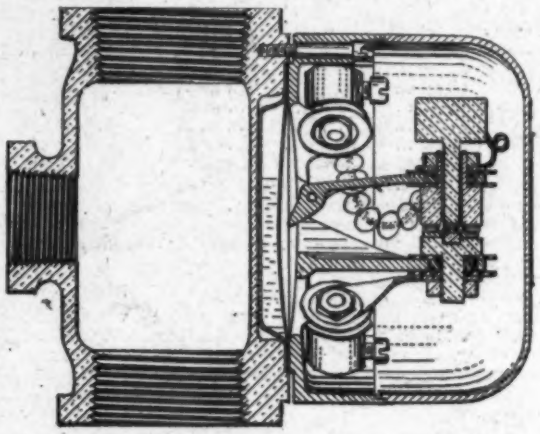


FIG. 2.—THERMAL SWITCH FOR ELECTRIC WATER HEATER.

having the current-limiting feature, is regarded as the most efficient and inexpensive where a limited quantity of water is required.

In the favoured design the electrodes consist of a tube within a cylinder; the water is slowly admitted from the bottom, and gradually rises, filling the electrode space, the current correspondingly rising from zero to maximum, and the reverse action occurs when the water is turned off and the heater drained. The heater has therefore no detrimental effect on the regulation of the circuit. Heaters of this type of about 5-KW. capacity can be installed on double-throw switches with ranges, and will produce limited quantities of boiling water at a very low cost.

Nine of the companies in the North-West have installed a total

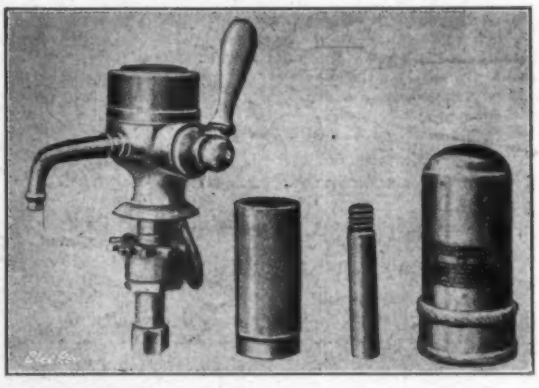


FIG. 3.—INSTANTANEOUS TYPE ELECTRIC HEATER SHOWING PARTS.

of 1,930 water heaters, with a connected load of 3,560 KW.; a thousand of these are on one system.

Feeder Diversity of Electric Ranges.—A paper on this subject dealt with the effect of the electric range load on a lighting feeder, as the immediate question is that of supplementing feeder capacity where the range is threatening to establish a peak.

To observe the effect of the ranges, observations were taken during two weeks on six feeders in both winter and summer; each feeder was rated at 100 amperes at 2,300 volts, single phase. The results were as follows:—

Ranges	13	39	13	21	11	6	
Load factor (winter) ...	40·6	37·1	35·8	38·5	36·8	37·9	
Ranges	13	53	17	25	17	6	
Load factor (summer)...	33·4	43·7	34·1	27·9	30·7	28·3	

It is noted that feeders with a small number of ranges show decreasing load factors as summer approaches, while feeders with a large number of ranges show increasing load factors, the only exception being a feeder with a summer amusement park on it. In order to get more accurate information, one feeder with considerable range load was further tested; this supplied small frame houses, a few large houses, and one apartment house, the

sumers being office and professional men. The following data was obtained :—

Total number of residences	643
Total number of electric ranges...	53
Total capacity connected in ranges	303·3 KW.
Total number of electric water heaters ...	29
Total capacity, electric water heaters	21·65 KW.
Total number of transformers	44
Total capacity, transformers	437·5 K.V.A.

Daily Load Data.

	Average. K.V.A.	Maximum. K.V.A.
Sunday	59·0	109·7
Monday	62·2	91·7
Tuesday	69·3	107·0
Wednesday	68·4	107·5
Thursday	61·8	97·3
Friday	63·7	111·2
Saturday...	66·3	112·0

Average, 64·4.

Weekly apparent load factor, 57·5 per cent.

From the load curves obtained, it is noted that there is a night load of over 40 K.V.A. on every night, accounted for as to half by water heating and the remainder by all night lighting, and feeder, transformer, and meter losses.

Deducting the 20 K.V.A., with an additional 20 K.V.A. for lighting from the largest range peak (as shown by load curves), 107 K.V.A., there is a net range peak of 67·5 K.V.A. at 6 p.m. on the Wednesday, which, compared with the connected load of 303·2 K.V.A. in range capacity, gives a demand factor of 4·5.

Looking to the future, it is considered that the area served by this feeder will have six times as many ranges—*i.e.*, 318 of 1,820 K.V.A. rating. If this were handled by six feeders of present capacity it is clear that their characteristics would be similar to the present one, with the exception that the lighting and ironing peaks would be 1·6 times as large as at present. The winter peak for the feeder was 193·2 K.V.A. with 39 ranges, which, with a 3·9 demand factor, would give a maximum range load of 60 K.V.A., leaving 133·2 K.V.A. for lighting and losses.

Taking one-sixth of this, there would be a lighting and loss load of 22·2 K.V.A. plus a 67·5 K.V.A. peak due to ranges, giving a total maximum demand of only 89·7 K.V.A., or less than half the capacity of the feeder.

Even allowing one-third of the district to a feeder, in which case there would be a lighting and losses load of 44·4 K.V.A. plus 129·1 K.V.A. (for 106 ranges of 607 K.V.A. rating with a demand factor of 4·7), the load of 173·5 K.V.A. is within the capacity of the feeder.

Further, assuming the case of only one additional feeder, lighting and losses would account for 66·6 K.V.A., which, with 159 ranges of 910 K.V.A. capacity and demand factor 5·2, would only give a maximum load of 241·6 K.V.A., which a slightly larger feeder could handle.

The author, therefore, comes to the conclusion, that on present admittedly inaccurate data, so far as feeders are concerned, the excellent diversity of the electric range will make it possible to handle very considerable loads with only slight increases in feeder investment.

(*To be concluded.*)

THE INSTITUTION OF ELECTRICAL ENGINEERS.

Abstract of the Inaugural Address delivered by Mr. C. H. Wordingham, *President, November 8th*, 1917.

The Institution as now Constituted.

I propose to take for the main subject of my address this evening the Institution itself; to consider how far it meets the needs of the profession and industry, and what improvements can be made under its existing constitution; then to inquire whether it may not be possible to raise it to a far higher plane and make it much more potent in the development of electrical engineering. The Institution and the industry should be one, and if they are not, it is our business to make them so.

I have seen from time to time, with great regret, indications that many members are not wholly satisfied with the management of the Institution, and have heard expressions of opinion that it does not sufficiently represent the industry or look after its interests adequately.

These allegations are, in many instances, based upon ignorance of what the Council is doing, but more largely upon a want of appreciation of what it is possible for the Council to do. The Institution comprises in its members every electrical interest in the country; those interests are heterogeneous, and in many cases the interests of one section of the members directly conflict with those of another section. How, then, is it possible for the Council, in the name of the Institution as a whole, to represent adequately the material interests of one particular section without doing an injustice to another section? I have always held the view that the Institution should attend to the promotion of electrical science and its applications to engineering; it should promote research of every kind; it should encourage the spread of scientific knowledge and the improvement of engineering practice; it should set the highest possible standard of conduct and of attainment in knowledge and skill among its members, but it should not attempt to look after the commercial interests of any one section. It is often stated, in a somewhat sneering manner, that the Institution will not demean itself by looking after such sordid considerations as those involved in commercial pursuits, though its members, one and all, have necessarily to pocket their profits if traders, or their fees if consultants.

No greater misrepresentation of the attitude of mind of those who see the limitations I have indicated could be made. The reason that I contend the Institution should not attempt to interfere with commercial matters is that it is impossible for it to do so efficiently. It is of the essence of the successful prosecution of commercial interests that those interests should be common and homogeneous, and I have always held most strongly that each section should organise its own association for the promotion of such interests so as to bring the greatest possible weight to bear by concentrating the whole action in one direction. This course was followed at an early stage by municipal engineers who formed the Incorporated Municipal Electrical Association. Much later there has been formed the British Electrical and Allied Manufacturers' Association to look after the manufacturing interests. Other associations have been created for other interests which I need not enumerate. There can be no question whatever of the value that the two Associations I have particularised have been to the interests concerned, and this work has been accomplished simply and solely because each has been homogeneous and has only sought to serve the interests of the particular group of individuals affected. If each section is thus benefited, it necessarily follows that the industry as a whole is advanced.

I believe also that much apprehension arises from the fact that the proceedings of the Council are secret. Representations have been made from time to time to the effect that some account of each Council meeting should be communicated to members through the *Journal*, and an attempt has been made to publish those portions of the Council minutes which it has been thought might be communicated without detriment. I am afraid it is impossible effectually to meet this demand. Much of the matter which comes before the Council is of necessity confidential, and negotiations and communications take place which it would be impossible to publish without causing much mischief and defeating the objects in view. In my view the only possible course is for members to trust those of their number whom they have elected to the Council, and to believe that they are doing their best to ensure the good of the Institution and watch over the interests of its members.

It is an unfortunate fact that a very large number of members abstain from voting at the Council elections. The normal proportion of votes recorded to voting papers sent out is about 25 per cent. Obviously, if members will not take the trouble to secure the return of members in whom they have confidence, it does not lie with them to find fault later with the Council. Personally, I am very fully impressed with the need for a thoroughly representative Council, and I should like to see some change made in the mode of its election which would ensure that each section of the members was directly represented thereon in proportion to the numbers in that section. For example, I should like to see the important groups, such as the telegraph and telephone members, the manufacturing members, the municipal members, the company supply members, and so on, each vote for their own representative or representatives, thus ensuring that those representing a specific interest were chosen by the whole body of members devoted to that interest. In addition, I would have a certain number elected by the whole body of members independently of any group representation. There would undoubtedly be difficulties in the way of such a modification in existing practice, and the matter cannot be discussed adequately outside the Council, but I hope that when the next revision of the Articles takes place this matter may be given very full consideration with a view to making the Council as representative as possible in every way.

Yet another matter which calls for attention is the undoubted feeling that London members have a decided advantage over those living outside London and abroad. Not only are they thought to get more than the other members, but in some quarters there is an idea that there is a tendency for them to run the Institution. Every effort has been made by the Council in the past to remove any possible grounds for this feeling. The creation of the Local Sections, their representation on the Council, and the weight given to all suggestions received from such Sections have gone far to bring members outside London into full touch with the conduct of the Institution. The meetings held locally afford the same opportunities to members of meeting one another and of discussing Institution papers as are enjoyed by the London members; important papers read in London are read also at these meetings, in addition to local papers, and there is considerable activity locally, stronger it is true in some districts than in others. The introduction of proxy voting, decided on last session, goes far also to put all members on an equal footing, independently of geographical position.

It is of the utmost importance to the well-being of the Institution that any feeling of the kind I have mentioned should be wiped out. I think it would be desirable occasionally to hold a full meeting with President and Council in some of the more important centres, such as Manchester, Leeds, Birmingham, Newcastle, and possibly Glasgow. Not only would such a course quicken the interest of the members resident in the district, but it would serve the independent purpose of making the Institution better known to those outside the profession.

Turning now to London itself, we may well inquire whether the Institution is doing all that it can for the advancement of its legitimate objects. Many members think that it is not, and I am afraid there is some ground for their doubts. This year we are peculiarly handicapped through the commandeering of our building by the Government. I have often felt that the large sums of money invested in the fine building that we possess on the Embankment have not brought in the return in usefulness that they should. The load factor of the building is painfully low. It is true that the lecture theatre is often lent to other societies, but how often is it filled by the members of the Institution? For what proportion of the members is the common room a place of rendezvous? And how many members ever enter the library or avail themselves of the magnificent collection of books therein? When one sees the extraordinary success of such an institution as the Manchester Engineers' Club in bringing together so many different kinds of people interested in engineering and in initiating useful schemes for the good of the industry, one cannot help asking oneself why it is that something of the sort cannot be done, and done on a far larger scale by the Institution. It is true that Manchester is an altogether exceptional centre, but there is a great number of electrical engineers within a very moderate radius of Charing Cross, and if only the right scheme could be hit upon I am convinced that the Institution could be made an active centre of everything electrical. Even country members are often in London, and they would soon flock to the Institution if they knew they would meet there the men they want to see.

There seems to be something about the ordinary formal meetings which is found to be forbidding in some ways to many members, more especially to the younger ones, and there is a want of the sociability and willingness to take part in the discussions which one finds in most of the local centres. Now that meetings have to be held at 6 p.m., I should like to see arrangements made for the meeting to be followed by an inexpensive dinner. This would suit the convenience of many members living out of town, and it would unquestionably promote acquaintanceship between members and greater familiarity among them.

Then, again, I think short informal meetings, at which points of difficulty or special and immediate interest could be discussed in a more or less conversational manner, would be of great utility. Such meetings would encourage the younger members to come forward. Many who, though possessing valuable knowledge and ideas, are too diffident to write papers or join in formal discussions, would take part in proceedings of this kind, and while adding to the usefulness of the meeting would be encouraged, once the ice were broken, to join in the ordinary meetings. I am confident that the progress of the Institution will be greatly helped by interesting the younger members in its doings, and every possible means should be taken to effect this end.

It would be of extreme value if the Institution were to arrange for a series of lectures on special subjects by experts in those subjects setting forth what has been accomplished in the particular branch concerned, and giving a general idea of the present position of knowledge. For example, electric furnaces have developed to an extraordinary extent during the last few years; electrical theory has undergone many modifications and much development; a practically new field in electrical cultivation is being opened up, and many other examples will suggest themselves.

Again, I should like to see something done with a view to interesting the enormous army of men not qualified to become members in any grade of the Institution, but on whom much of the welfare of the industry depends. I refer to the workmen class. It should be possible to awaken in these men, many of whom are exceedingly intelligent, a desire for a better knowledge of the principles underlying their work. We have seen attempts made by individual firms to promote such interest by the holding of examinations and the offering of prizes; surely if an individual firm can create interest in this manner, is should be possible for the Institution to do far better. The opportunity could be utilised for educating workmen also in the economic questions which are vital to the success of the industry.

The Institution might with advantage come out of its shell and cater for the education of the general public in electrical matters. Popular lectures on the lines so successfully followed by the Society of Arts and the Royal Institution would do much to spread an elementary knowledge of electrical subjects, and to make the public realise the advantages of electrical appliances. Lectures which gave solid facts to individuals of ordinary common sense would, I believe, do far more to promote the objects sought by so-called "publicity campaigns" than any amount of exaggerated statements, or of posters and illustrations, imagined by their authors to be humorous or arresting.

This branch of the work might be supplemented by a carefully organised permanent exhibition of electrical appliances, these being constantly changed, and demonstrations of new apparatus arranged for. It ought to be a well-understood thing that if any new useful electrical invention is brought out it can be seen at the Institution as a matter of course, and an explanation of its action be forthcoming.

From time to time conversaziones might be held on the lines of those given by the Royal Society for many years past. At these, members would bring forward their latest achievements and give demonstrations of their discoveries.

Such a programme would involve an enormous amount of work, but the Institution can only effect useful results by work, and unless we put the energy in we shall most certainly fail to get anything out.

Much more ought to be done in the direction of research. A useful beginning has been made, but there is a practically limitless field to be covered. Speaking from a very intimate experience of the work, I am of opinion that it cannot be looked after adequately if it be dependent solely upon the efforts of overworked members of Council, who can only give portions of their time spasmodically to the work. The Institution ought to have one or more well-paid men of the highest scientific attainments to look after technical questions such as research, and the organisation of the various fields of activity which I have indicated.

The Institution Reconstituted.

I have spoken so far of what might be done by the Institution under its existing constitution, but it is seriously and unnecessarily handicapped by being constituted under the Companies' Acts. I am ambitious for the Institution; I want to see it occupying its proper place in the life of the nation and in the enjoyment of a Royal Charter, which shall confer on it those powers which alone can enable it to take effectual action for the good of its members and of the general public whom they serve.

It is a matter of common knowledge that the electrical industry has suffered severely in the past from ill-advised legislation, but it is not, perhaps, so widely recognised that it has been seriously hampered by the absence of mandatory powers appertaining to any body within the profession. The feeling is widespread that compliance with some standard of education, training, and experience should be enforced before a man is allowed to call himself an electrical engineer, and that adherence to certain standards of professional conduct should be a necessary condition of his continuing to practise; at present anyone can call himself an electrical engineer, and no one has the right to object.

The position in regard to the promulgation of rules regulating electrical practice in essential particulars is most unsatisfactory. The Institution has drawn up such rules, but can give them no mandatory force, with the result that those contractors who recognise their necessity and value, and who wish to support the Institution loyally, are placed at a serious and unfair disadvantage in competing with less scrupulous firms who flout the rules, knowing that they can do so with impunity. Bad work is thus put in to the detriment alike of the sound contractor and the public, while the reputation of the industry suffers and its progress is retarded.

Most engineers are agreed as to the imperative necessity of standardising practice in regard to manufacture, both as regards the rating of machinery and the interchangeability of parts of articles in common use, but although an immense amount of work has been done in preparing such standards, no power whatever exists to enforce them, and in the absence of compulsion, which would put all manufacturers on an equal footing, firms who would gladly comply with the requirements hesitate to incur the expenditure necessary to bring their practice into line with them, while others, taking a narrow and short-sighted view, deliberately refuse to adopt them. The result is that the cost of manufacture is unnecessarily high, and users suffer inconvenience from the diversity of practice, the spread of the use of electrical appliances being retarded in consequence.

The absence of any authority which has the power to say whether a given article conforms with certain regulations or standards, or attains some specified degree of excellence, is a serious impediment to trade, especially to British trade abroad, which is perhaps somewhat imperfectly realised. I shall enlarge on this later.

The medical and legal professions already have the power to regulate the admission of new members to their ranks, and to expel those unworthy to continue in them, and there can be no inherent reason why the engineers, on whom depend the lives of countless thousands of the general public, should be denied similar powers.

I am aware that there are serious difficulties in giving effect to the views I have enunciated. In the first place, electrical engineers, though they touch at one point or another the work of almost every other class of engineer, are but one of several important groups. It is difficult for one section of engineers to obtain powers not sought by other sections, and unquestionably our efforts ought first to be devoted to carrying with us those other bodies, such as the Institution of Mechanical Engineers, the Institution of Naval Architects,

and more especially that mother of institutions, the Institution of Civil Engineers, to which we, as an Institution, owe so much. If our efforts to promote this joint action fail, then we must still try what we can do on our own account, but concerted action must unquestionably give the best results. Engineering in the widest sense would then be placed on the same footing as other professions, and be similarly recognised by Government. The powers and privileges granted would be delegated to, and exercised by, the several Institutions for the branches which they respectively represent.

Electrical differs from all other kinds of engineering in the extraordinary variety of the operations included in the general term. We have professional men, large manufacturing firms, municipal engineers, manufacturers of heavy plant, makers of telegraphic and telephone apparatus and instrument makers, electrochemists and makers of batteries. New branches of work are daily opening up, such as electric furnaces which trench on the great steel industry, and electroculture, at which point we touch farming.

No other Institution has so many and such varied interests to represent, nor has any other profession need for anything approaching the elasticity as to the qualifications to be demanded of those entering its ranks as our own. It is for these reasons, probably, in large measure that the present unsatisfactory state of affairs has arisen, but the difficulty of the problem only makes its solution the more imperative.

Owing to the importance of certain sections, influential bodies outside the Institution have grown up. It is eminently right and proper that they should be formed to look after those members who have common material interests. It is, however, equally important that there should be no overlapping, and that they should confine themselves to those branches of work which the Institution cannot do so efficiently as they. I deprecate most strongly anything in the nature of rivalry. The ideal that I look forward to is a strong Institution, endowed with a Royal Charter, recognised as the embodiment of the whole industry as far as those outside it are concerned, invested with full powers as to the educational qualifications to be possessed by all grades of workers in the profession and industry from the highest to the lowest, and effecting under its ægis the federation of all other associations connected with the multifarious branches of electrical work.

We cannot expect more than one body to be recognised by the Government and the public as standing for the electrical industry, and it is vital to all concerned that such recognition should be bestowed on an association that is truly representative of the entire industry, and that has the maximum weight of authority and numbers behind it; this the Institution would possess if constituted and worked on the lines I have indicated.

A beginning should be made at once, and I see no reason, if all will pull whole-heartedly and loyally together, why the ideal should not be realised. Most of the members of other electrical associations are already members of our Institution, many of them active ones, and if they were satisfied that we were in a position authoritatively and effectually to help their respective organisations there can be little doubt that they would support the federation I suggest, and work unreservedly to assure the Institution occupying the leading position that it should, sinking all rivalry if such rivalry exists.

Broadly, my view is that each section should have its own association to look after its commercial interests, such associations being formed if not already existent for a particular branch, and that each should be represented directly in appropriate proportions on the Institution's Governing Body. The Institution to be given a definite status by the Government, and recognised as the only body representing electrical engineering; the Institution to control entry into the profession, and all regulations on electrical matters to be issued at its instigation, or in accordance with its advice. Grants in aid of research or other national purposes to be entrusted to the Institution for administration.

It may be argued that the Institution, even though modified in its constitution in the manner suggested, would still have the difficulties I emphasised earlier in my address in regard to the discordant commercial interests of different sections of its members. To some extent this is probably true, but its authoritative position would enable it to compose many differences which it is now powerless to influence, and in very few cases would it be found necessary for any special Association to take independent action; but in the last resort this could be allowed without detriment to the scheme.

(To be continued.)

The Metric System.—The Education Committee of the London County Council has had under consideration the following resolution passed by the Central Consultative Committee of Head Masters:—"That the time is now ripe for the compulsory introduction of the metric system," and recommends "That the Council is of opinion, on educational grounds, that the time has arrived for the compulsory introduction of the metric system, and that a communication to this effect be conveyed to H.M. Government."

NEW PATENTS APPLIED FOR, 1917.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by Messrs. W. P. Thompson & Co., Electrical Patent Agents, 285, High Holborn, London, W.C., and at Liverpool and Bradford.

15,722. "Holders or fittings for electrodes of electric furnaces." P. Fawcett & J. R. Hoyle. October 29th.

15,736. "High-tension distributors for ignition in multi-cylinder internal-combustion engines." Akt. Ges. Brown, Boveri et Cie. October 29th. (Germany, November 6th, 1916.)

15,741. "Electric pocket-lamp." Comp. Ihoebus E.G. October 29th. (Switzerland, October 28th, 1916.)

15,745. "Electric furnaces for melting metals." A. G. Bloxham (Stabilimenti Biak-Ing. A. Pouchain). October 29th.

15,774. "Electric arc lamps." A. E. Angold & A. H. Railing. October 30th.

15,777. "Electric switches." J. C. Willcocks. October 30th.

15,779. "Locking device for electric lamps." W. & T. Avery & F. C. G. Hill. October 30th.

15,810. "Telephone systems." R. L. Murray. October 30th.

15,815. "Electric accumulators." Chloride Electrical Storage Co. and H. Dean. October 30th.

15,821. "Test sheath joint for electric cables." C. J. Beaver & E. A. Claremont. October 30th.

15,837. "Electrical transformers." F. E. Berry. October 30th.

15,844. "Radio-telegraphy or telephony." Soc. Francaise Radio-Electrique. October 30th. (France, October 30th, 1916.)

15,846. "High-frequency alternators." Soc. Francaise Radio-Electrique. October 30th. (France, October 30th, 1916.)

15,849. "Electric torch case." R. E. H. Fletcher. October 31st.

15,883. "Gas burners and electric lights." F. J. Gould & F. S. Stamp. October 31st.

15,888. "Electrodes for electric arc welding." E. Languepin. October 31st.

15,897. "Electrical storage batteries or accumulators." I. E. Koelmeyer. October 31st.

15,901. "Holder for electric lamp shades and lamps." T. H. A. Brown. October 31st.

15,927. "Electric gas-lighter." M. Compare & E. Pizzi. November 1st.

15,930. "Sparking-plugs." C. Bryan. November 1st.

15,970. "Electric plug." E. H. Keeley. November 2nd.

15,978. "Dynamo-electric machinery." Electromotors, Ltd., E. Grenhalgh & B. Longbottom. November 2nd.

15,992. "Incandescent electric lamps." R. Butler. November 2nd.

16,008. "Telephone control systems." M. Tocchio. November 2nd.

16,017. "Heating electrode." G. Bellaviti. November 2nd.

16,021. "Sound detectors." Western Electric Co. November 2nd.

16,024. "Telephone transmitters." S. G. Brown. November 2nd.

16,039. "Means for completing an electric circuit, specially applicable to alarm clocks." H. O. Farrell & A. Ward. November 3rd.

16,053. "Electrical resistance material elements." C. G. Nobbs & Falkirk Iron Co. November 3rd.

16,054. "Electric heater." Falkirk Iron Co. & C. G. Nobbs. November 3rd.

16,072. "Indicating condition of steel, iron, etc., magnetisable metal during heat treatment." E. P. Barfield. November 3rd.

16,074. "Prismatic glassware for illuminating purposes." Holophane, Ltd. (Holophane Glass Co.). November 3rd.

PUBLISHED SPECIFICATIONS.

The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1916.

12,783. Telephone Systems. Western Electric Co. & A. E. Reinke. September 9th, 1916. (110,177.)

14,521. Electrical Commutators. W. R. Sykes Interlocking Signal Co. and R. W. Tarrant. October 12th, 1916. (110,192.)

14,522. Electrical Commutators. W. R. Sykes Interlocking Signal Co. and R. W. Tarrant. October 12th, 1916. (110,193.)

14,768. Separators for Electric Batteries. G. Oldham. October 17th, 1916. (110,204.)

14,842. Electrical Apparatus controlled from a distance. Metropolitan Carriage, Wagon & Finance Co., W. G. Wilson, W. A. Tritton & D. K. Morris. October 19th, 1916. (110,207.)

15,252. Process or Method of Uniting Similar or Dissimilar Metals or Alloys by Electric Welding. H. L. T. Wolfe. October 26th, 1916. (110,214.)

16,749. Brakes on Electric Tramcars and like Vehicles. R. H. Wilkinson & W. H. Turner. November 22nd, 1916. (110,231.)

16,760. Dynamo-electric Machines, particularly adapted for Starting and Lighting Systems. A. E. White (U.S. Light & Heat Corporation). November 22nd, 1916. (110,232.)

17,072. Regulating Devices for Internal-combustion Engines coupled with Dynamo-electric Machines. Soc. Auxiliare des Tramways & Chemins de Fers Soc. Anon. November 29th, 1915. (102,501.)

17,993. Collection of Currents from Overhead or other Conductors. C. C. Henkes. June 13th, 1917. (110,244.)

18,040. Electric Switches. M. J. Railing. December 15th, 1916. (110,245.)

18,095. Electric Motor Control Systems. British Thomson-Houston Co. (General Electric Co., U.S.A.) December 16th, 1916. (110,246.)

18,193. Protective Devices for Electric Circuits. British Thomson-Houston Co. (General Electric Co., U.S.A.) December 19th, 1916. (110,247.)

18,287. Apparatus for the Electro-deposition of Metals. F. R. Tubbs. December 21st, 1916. (110,248.)

1917.

872. Electric Connecting Devices for use in Internal-combustion Engines. J. Zeitlin. January 17th, 1917. (110,255.)

1,062. Switching Apparatus for Electric Transformers. W. J. Howard and A. Reyrolle & Co. January 22nd, 1917. (110,259.)

1,575. Contact-breaker Devices for the Ignition Mechanism of Internal-combustion Engines. Villiers Engineering Co., G. Funck & F. H. Farrer. January 31st, 1917. (110,266.)

1,764. Dynamo-electric Machines. P. A. H. Mossay. February 3rd, 1917. (110,269.)

6,309. Electric Motor Control Systems. Igranic Electric Co. (Cutler-Hammer Manufacturing Co., U.S.A.) May 3rd, 1917. (110,311.)

9,267. Dynamo-electric Generators. V. Crabb. June 28th, 1917. (110,329.)

10,575. Circuit Interrupting Devices. British Westinghouse Electric and Manufacturing Co. (Westinghouse Electric & Manufacturing Co., U.S.A.) July 23rd, 1917. (110,332.)